Report on
Railway Safety and Interoperability in the EU

2018

EUROPEAN
UNION
AGENCY
FOR RAILWAYS

* Following the entry into force of the technical pillar of the Fourth Railway Package (Reg. 2016/796), the European Union Agency for Railways replaces and succeeds the European Railway Agency. In several parts of the report, this may be referred to as the "Agency".

Printed by the Publications Office in Luxembourg

Manuscript completed in June 2018

Neither the Agency nor any person acting on behalf of the Agency is responsible for the use which might be made of the following information.

Luxembourg: Publications Office of the European Union, 2018

Print	ISBN 978-92-9205-393-2	ISSN 2467-3730	doi:10.2821/49834	TR-AF-18-001-EN-C
PDF	ISBN 978-92-9205-392-5	ISSN 2467-3749	doi:10.2821/205360	TR-AF-18-001-EN-N

© European Union Agency for Railways, 2018

Reproduction is authorised provided the source is acknowledged. For any use or reproduction of individual photos or illustrations, permission must be sought directly from the copyright holders.

Contents

List of Figures

List of abbreviations

ATP	Automatic Train Protection
C&DwF	Collisions and derailments accidents with fatalities
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CARE	European centralised database on road accident
CCM	Change Control Management
CCS TSI	Control Command and Signalling Technical Specification for Interoperability
CER	Community of European Railway and Infrastructure Companies
CNC	Core Network Corridors
COTIF	Convention concerning international Carriage by Rail
CSI	Common Safety Indicators
CSM	Common Safety Method
CST	Common Safety Target
CUI	Common User Interface
CT	Channel Tunnel
DG MOVE	Directorate General for Mobility and Transport
EASA	European Aviation Safety Agency
EC	European Commission
ECM	Entity in Charge of Maintenance
ECVVR	European Centralised Virtual Vehicle Register
EMSA	European Maritime Safety Agency
ENE TSI	Energy Technical Specification for Interoperability
ERA	European Union Agency for Railways
ERADIS	European Railway Agency Database of Interoperability and Safety
ERAIL	European Railway Accident Information links
ERATV	European Register of Authorised Types of Vehicles
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
EU	European Union
FWSI	Fatalities and weighted serious injuries
GSM-R	Global System for Mobile Communications – Railway
IM	Infrastructure Manager
INEA	Innovation & Networks Executive Agency
INF TSI	Infrastructure Technical Specification for Interoperability
LOC&PAS TSI	Locomotive and Passenger Rolling Stock Technical Specification for Interoperability
MA	Moving average
MS	Member State
NIB	National Investigation Body
NOI TSI	Noise Technical Specification for Interoperability
NRV	National reference values
NSA	National Safety Authority
NTR	National Technical Rules
NVR	National Vehicle Register
OB	On-board
OBU	On-board unit
PRM TSI	Persons with Reduced Mobility Technical Specification for Interoperability
RBC	Radio Block Centre
RDD	Reference Document Database
RID	Regulation concerning the International Carriage of Dangerous Goods by Rail
RINF	Register of Infrastructure
RST	Rolling Stock

RU	Railway Undertaking
SAIT	Safety Alert IT tool
SERA	Single European Railway Area*
SIS	Safety Information System
SRT TSI	Safety in Railway Tunnels Technical Specification for Interoperability
TAF TSI	Telematics Applications for Freight Services Technical Specification for Interoperability
TAP TSI	Telematics Applications for Passenger Services Technical Specification for Interoperability
TDD	Train Drivers Directive
TEN-T	Trans-European Transport Network
TPS	Train protection system
TSI	Technical Specification for Interoperability
UNIFE	The Association of the European Rail Industry
VKM	Vehicle Keeper Marking
VKMR	Vehicle Keeper Marking Register
VVR	Virtual Vehicle Register
WAG TSI	Wagon Technical Specification for Interoperability

* geographical area covering the EU28, Switzerland and Norway

List of country codes*

BE	Belgium
BG	Bulgaria
CZ	Czech Republic
DK	Denmark
DE	Germany
EE	Estonia
IE	Ireland
EL	Greece
ES	Spain
FR	France
HR	Croatia
IT	Italy
CY	Cyprus
LV	Latvia
LT	Lithuania
LU	Luxembourg
HU	Hungary
MT	Malta
NL	Netherlands
AT	Austria
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
FI	Finland
SE	Sweden
UK	United Kingdom
CH	Switzerland
NO	Norway

* Abbreviations of country names and the protocol order in this list are based on the EU Interinstitutional style guide.

Foreword by the Executive Director

The European Union Agency for Railway has entered a new era, with a fully-fledged package of tasks, involving the continuation of the progress with safety and interoperability, while getting ready for its role of authority for vehicle authorisations and single safety certificates.

The success of delivery calls upon an integrated Plan-Do-Check-Act cycle, in which the monitoring component plays an important role. As part of its reporting obligations according to the founding regulation, the Agency has prepared its first integrated report on the progress with railway safety and interoperability.

This builds upon the return of experience from the past reports on Progress with Safety and Interoperability, respectively, as well as from the pilot Railway System Report. It attempts to place, in a single structure, the most relevant indicators around safety and interoperability topics, while ensuring the comprehensive view of outputs, outcomes and impacts on the railway sector.

I strongly believe that good evidence can serve good decisions. This is why the Agency sees in this report, beyond the legal obligation, the opportunity to identify some key findings that could pave future actions in the scope of its mandate and its collaboration with the European Commission.

An overview of railway safety performance

1. One of Agency's main objectives is that rail passengers and freight get safely to destinations in the Single European Railway Area (SERA). The Agency notices an overall improvement in the safety performance at EU level over the last 8 years.

2. The EU is second ranked in a comparison with Australia, Canada, Japan and USA for ensuring a low railway safety risk over the period 2012-2016. In terms of passenger fatality risk, however, the gap between the EU and the best ranked remains rather high.

3. In a multi-modal comparison, rail appears as the safest mode of land transport in the EU, with a fatality risk for the train passenger being by one third lower compared to the risk of a bus/coach passenger.

4. While there is a long downward trend, the Agency is concerned to see that in the period 2014-2016 the number of fatalities and serious injuries per railway accident increased in SERA. The year 2016 seems to have marked a peak for the number of collisions, derailments, accidents with 5 or more fatalities and the corresponding number of fatalities and serious injuries.

5. Persisting variations among MSs are visible as regards fatalities and serious injuries. The ranking is different depending on whether the values are normalised with the traffic or not. Sufficient attention should also be paid to the non-normalised values. The Agency draws attention on the importance of ensuring a continuous downward trend of the fatalities and serious injuries in all MSs. In addition, the variance between MSs should be also substantially reduced, by gradually ensuring the convergence of the values from the least performing MSs towards the values of the best performing ones.

6. Though a relatively well controlled working environment compared to others, railways have seen an increase by 3.3% of the worker fatalities. The Agency draws attention on the need to make railway a safer working environment.

7. The total number of precursor incidents increased by more than 5% in the period 2012-2016. The availability of consistent and good quality data as regards the occurrences is of high importance in order to best address the identified risks through targeted supervision and other measures.

8. Fatalities and serious injuries in accidents at level crossings constitute an important proportion of the total number of victims for rail (close to 30%), while from the road perspective, the proportion is much smaller (1%). This is why level crossings safety deserves a good level of attention in the railway context. A steady improvement is visible in the level crossings safety over the period 2010-2016. However, for several Member States, there have been in 2016 poorer outcomes compared to the previous five-year averages, which poses significant concerns and flags the potential need for more substantiated actions, including a more coordinated action at EU level. The Agency could play a role in analysing the scope for technical and operational harmonisation for level crossings. More awareness and focus on level crossing safety can be raised together with the European Commission over the next period based on such analyses. These could allow for an integrated view rail-road and for identifying remedial infrastructure measures.

9. The Agency relies on the quality, completeness and timeliness of deliverables from the relevant bodies. A close communication and facilitation role is played by the Agency in relation with the NSAs and NIBs. With a relatively high proportion of NIB reports closed after 2 years or more and with a number of repetitive findings over time and across Member States, the Agency considers that there is further room for taking stock of the available information in order to improve the learning and decision making.

10. The Agency draws attention that railway unsafety is *also* expensive, with an estimate of at least 2 billion € for 2016.

Facilitating the completion of SERA – removing the remaining technical barriers

11. The progress in the deployment of the infrastructure related TSIs is slow over the period 2015-2017. Rather than being a measure of limited progress with interoperability, this may be a function of market needs (decisions on opening of lines, upgrade/renewals) and of funds availability for investments in the Member States.

12. ETCS deployment on the Core Network Corridors remains low (9% as of May 2018), which poses a challenge compared to the ERTMS European Deployment Plan targets (31% by 2023). A downward trend can be noticed for the ETCS L2 costs (currently below 100 k€/line km, without interlocking or radio communication costs), while there is an upward trend for the ETCS L1 costs (currently beyond 180k€/line km).

13. The total number of ETCS equipped vehicles in Europe is close to 9300 units, with an average annual increase rate of 12%. The average serial fitting cost for ETCS on-board (without one-off first-in-class costs) is still rather high 250k€/OBU.

14. Substantial progress in the "cleaning up" of the national rules for vehicles could be noticed. The total number of published RDD entries for national rules applicable for vehicles covered by TSIs dropped from about 14000 in January 2016 to 5700 in June 2018. Out of these, for the 17 Member States which published their rules after cleaning-up, the number is less than 800. Projected on all EU Member States, we estimate at short term around 1200 remaining national rules to be applied to vehicles on top of TSIs. A further reduction is expected after further cleaning up or during the next revisions of the TSIs.

15. As also envisaged by the ERTMS longer term strategy, the evolution of the ERTMS error change requests announces a longer period of stability for the set of specifications.

16. The proportion of train drivers holding a license in conformity with the Train Drivers Directive has increased over the period 2014-2018, reaching a level of 72%. The Agency draws attention that this is however a low value, considering the 100% target envisaged by the Directive for October 2018.

17. With the vehicle registers having a reasonable degree of data completeness and all the NVRs being currently connected to the ECVVR, the Agency has dedicated attention to monitoring the data completeness in RINF, particularly with the view to the vehicle-route compatibility check use case. As of May 2018, 81% of the SERA network is described in RINF as section of lines, whereas 78% of the parameters are available for the described sections. The Agency draws attention on the fact that RINF actual use depends substantially on data completeness and that this should progress with celerity.

The Agency is ready to play its part in tackling these, while the final results can only be reached by a coordinated and comprehensive set of actions involving all the relevant stakeholders and decision makers.

I am happy to underline this set of key findings, while inviting you to go through the details of the various indicators. I express my gratitude for all those who have contributed to this report, from NSAs, NIBs, sector organisations and companies, as well as the Economic Steering Group.

The report will undergo a continuous improvement cycle for its future editions, while ensuring traceability and continuity. Its future editions will include indicators related to the Fourth Railway Package, once the Agency will have started to perform its authority tasks for vehicle authorisation and single safety certification.

Josef Doppelbauer
Executive Director

1. Progress with Safety

SA 01 – Accidents, fatalities and serious injuries over time

What does the indicator measure and why?

The indicator measures the number of significant accidents, as well as the related fatalities, serious injuries and accident costs by year in the EU.

It also captures the risks of being a fatality or seriously injured if involved in a significant accident. We use the Fatality and Weighted Serious Injury notation (FWSI), where each fatality is factored 1 and each serious injury is factored as 0.1 fatality, to express these as a single number.

The indicator enables the measurement of safety performance at EU level.

What is the desired target value?

There are no explicit desired target values other than to maintain or, where practically possible, to improve railway safety in the Single European Railway Area (SERA).

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency.

What can we learn from the reported data?

Over the 2012-2016 period there have been, on average, just under 1950 significant accidents each year on the EU railways. In these accidents, on average, just under 1050 persons are killed and 850 persons seriously injured each year.

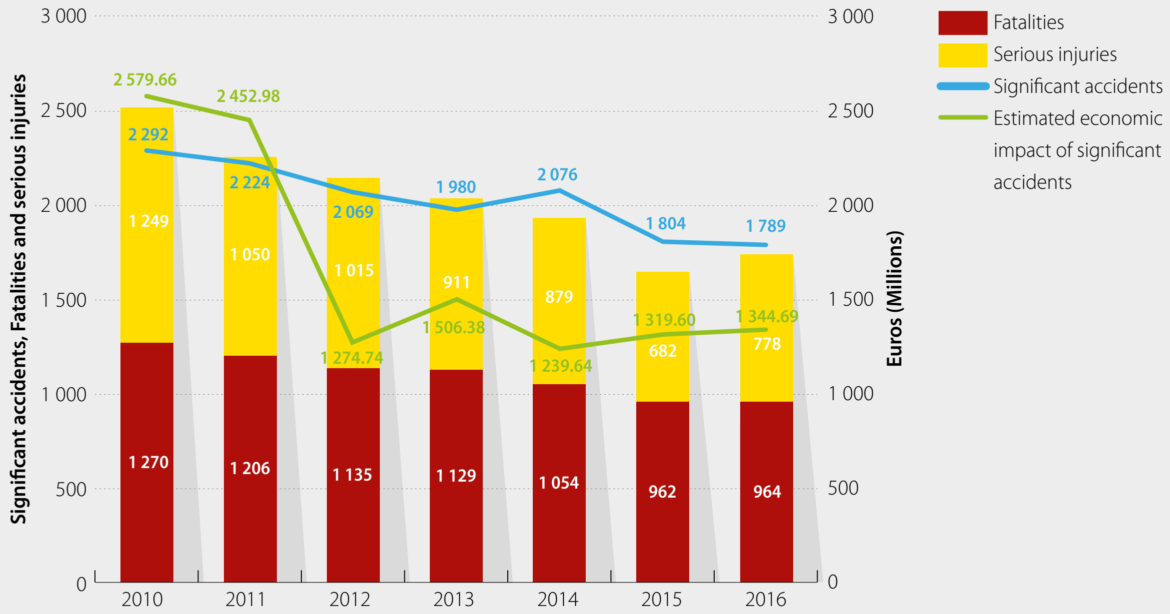
Figure 1 displays a fall in the number of significant accidents, fatalities and serious injuries between 2012 and 2016 of 3.6%, 4.0% and 6.5% respectively. Percentages are expressed as Compound Annual Growth Rates (CAGR).

However, in 2016, not all of these Common Safety Indicators (CSIs) improved across Europe. While there were fewer significant accidents compared to 2015, there was an increase in both fatalities and serious injuries. The estimated economic impacts of these accidents follow a similar pattern.

Figure 2 shows that the rate FWSI/Significant Accident has been improving since 2010, although there is considerable variation between the years and an ascending trend is noticed for the period 2014-2016. The numbers are all less than 1, indicating that not all significant accidents have fatalities or serious injuries.

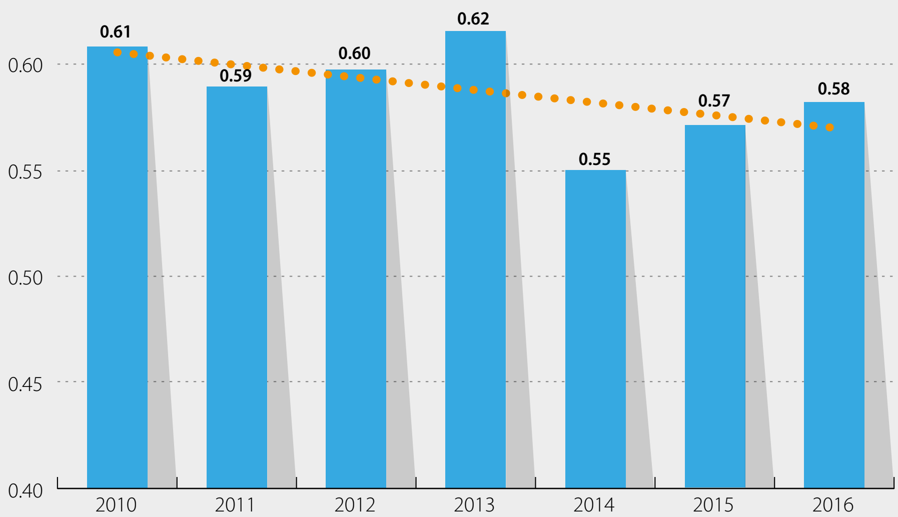
The Agency expresses a serious concern for the rising trend of fatalities and serious injuries per accident since 2014.

Figure 1: Significant accidents and resulting fatalities and serious injuries, EU 28, 2010-2016



Source: ERAIL

Figure 2: Fatalities and Weighted Serious Injuries (FWSI) per significant accident, EU 28, 2010-2016



Source: ERAIL

SA 02 – Accidents, fatalities and serious injuries by Member State

What does the indicator measure and why?

The indicator captures the geographical distribution of accidents, fatalities and serious injuries per Member State. The values are provided both non-normalised and normalised based on the traffic.

It is designed to help Member States in their tracking of continuous safety improvement, as set out in the Railway Safety Directive (1).

What is the desired target value?

There are no explicit desired target values other than to maintain or, where practically possible, to improve railway safety in the SERA.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency. While the numbers of fatalities is considered reliable, serious injury data are only fully harmonized from 2010.

What can we learn from the reported data?

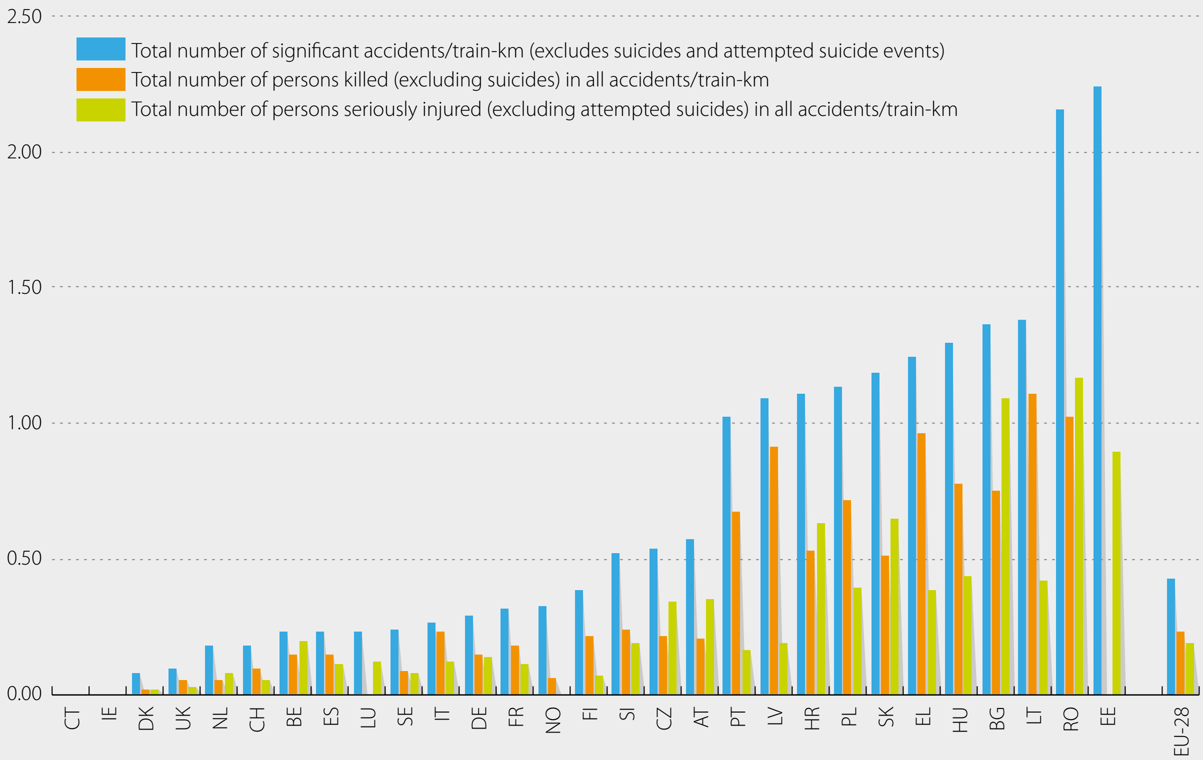
Figure 3 and Figure 4 show a significant variance in safety performance across Member States. Due to the current level of data granularity and taxonomy, the Agency cannot draw firm conclusions on the causes of this variance.

Figure 3 is based on normalised data, which allows an assessment of performance relative to risk exposure and therefore an understanding of the rate at which the railways in Member States are moving passengers and goods without harm. Although undoubtedly a useful analysis, it can create a distorted picture of rail safety if used alone because it assumes a linear relation between the safety performance of a Member State and its traffic volume, without considering the benefits in terms of investments and technical progress of the Member States. For this reason, non-normalised data is displayed in Figure 4.

It is evident from Figure 3 that the reduction in the variance of performance could bring a dramatic improvement in safety performance at EU level. The Agency draws attention on the importance of ensuring a continuous downward trend of the fatalities and serious injuries in all MSs. In addition, the variance between MSs should be also substantially reduced, by gradually ensuring the convergence of the values from the least performing MSs towards the values of the best performing ones.

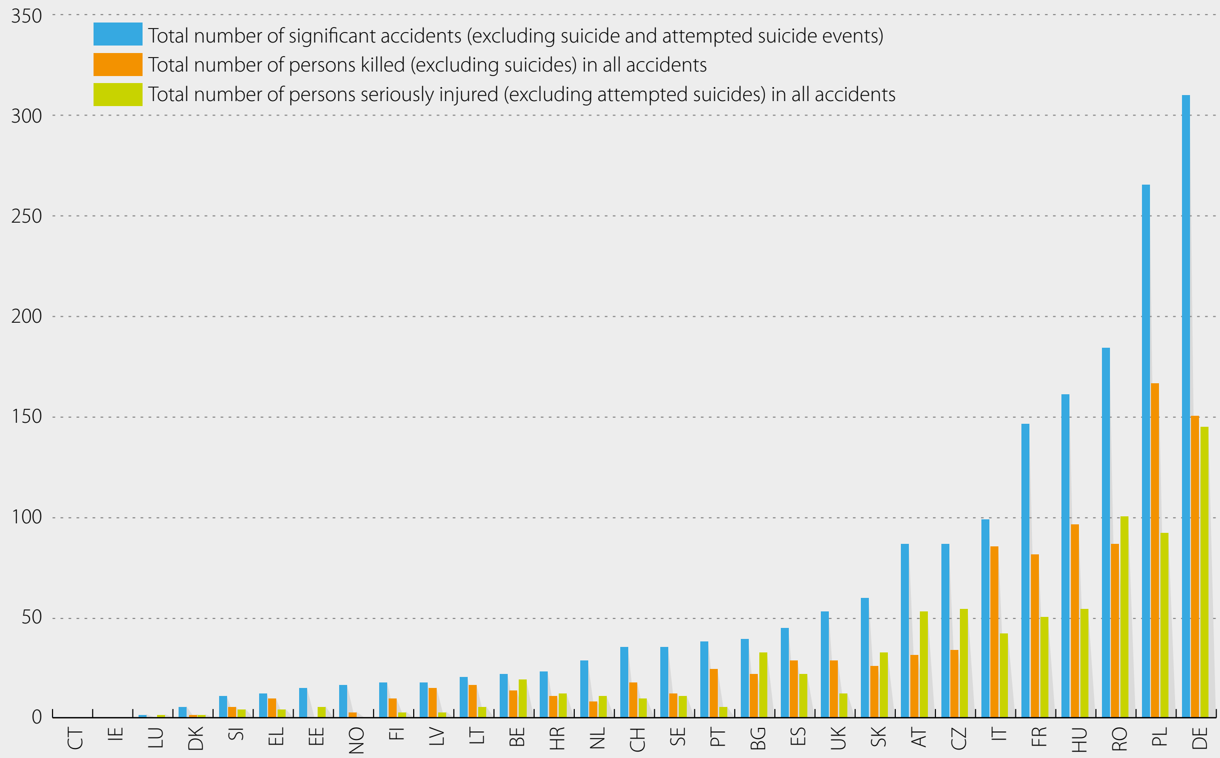
(1) Directive (EU) 2016/798 of the European Parliament and of the Council on railway safety

Figure 3: Number of significant accidents, total fatalities (including unauthorised persons, but excluding suicides) and total seriously injured (including unauthorised persons, but excluding attempted suicides) per million train-km, by country in SERA, 2012-2016



Source: ERAIL

Figure 4: Number of significant accidents, total fatalities (including unauthorised persons, but excluding suicides) and total seriously injured (including unauthorised persons, but excluding attempted suicides) on railways, by country in SERA, 2016



Source: ERAIL

SA 03 – Accidents number and types

What does the indicator measure and why?

The indicator shows the accidents distribution per type and year in the EU.

The focus is on the changes in the numbers of railway accidents between years and on whether or not the changes are statistically significant.

What is the desired target value?

There are no explicit desired target values other than to maintain or, where practically possible, to improve railway safety in the SERA.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency.

What can we learn from the reported data?

Figure 5 indicates that the number of significant accidents by type of accident recorded in 2016 was lower than the average for the period 2012-2016. Most categories of accidents decreased compared to the five-year average. Using standard statistical methods, the overall decrease is statistically significant.

The analysis of trends for fatal train collisions and derailments where fatalities occurred (Figure 6) shows a reduction in the accident rate between 1990 and 2015 of 4.5% (CAGR).

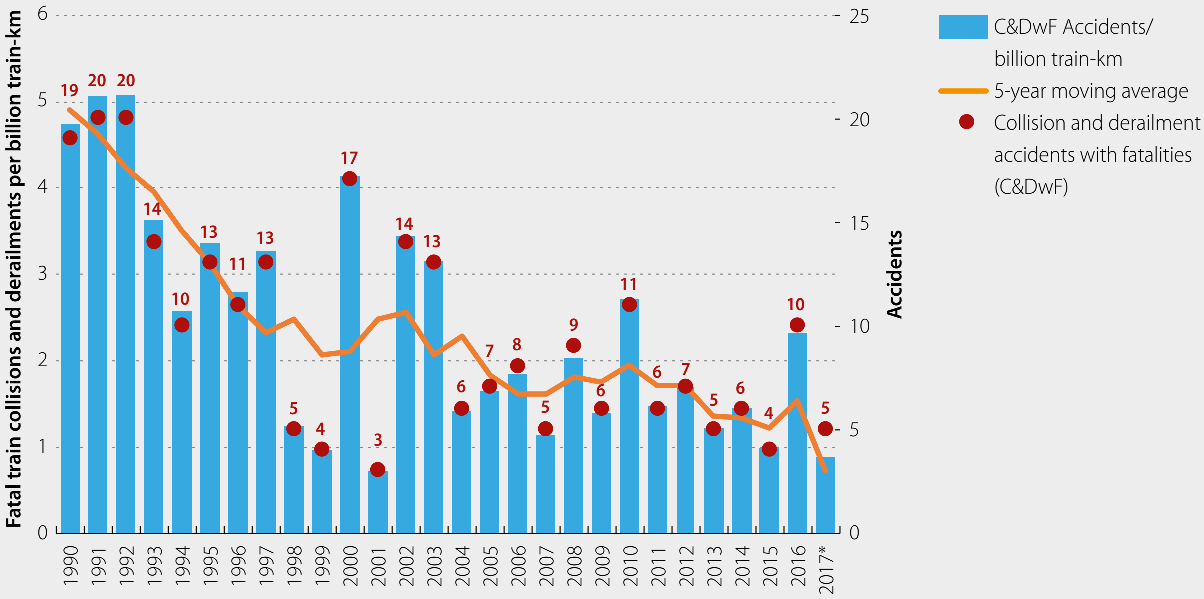
Despite the positive long term trends, the Agency was concerned to see that in 2016 there has been a statistically significant increase in these combined indicators. Based upon the estimated figures for 2017, the downward trend has resumed.

Figure 5: Significant accidents in 2016 compared to the 5-year mean (2012-2016)

	Number of Accidents 2016	Average number of accidents per year 2012 - 2016	+ / - compared to the average number 2012 - 2016	Statistically significant at the 5% level
Collisions of trains	101	109	-8	No
Derailments of trains	68	91	-23	Yes
Level-crossing accidents	433	498	-65	Yes
Accidents to persons	1069	1132	-63	Yes
Fires in rolling stock	37	28	+9	No
Other accidents	81	85	-4	No
All accidents	**1789**	**1943**	**-155**	**Yes**

Source: ERAIL

Figure 6: Collisions and derailments accidents with fatalities (C&DwF) per billion train-km, SERA, 1990-2017



Source: ERAIL and figures courtesy Prof. Andrew W. Evans, Imperial College, London
*Train-kilometres for 2017 are an estimate based on 2016 data.

SA 04 – Fatalities from significant accidents

What does the indicator measure and why?

The indicator captures the number of fatalities per victim category, the weight of various categories in the total number of fatalities occurred in the EU railway system, with and without suicides, as well as the number of accidents having five or more fatalities as consequence.

It is designed to help Member States in their tracking of continuous safety improvement, as set out in the Railway Safety Directive.

What is the desired target value?

There are no explicit desired target values other than to maintain or, where practically possible, to improve railway safety in the SERA.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency.

What can we learn from the reported data?

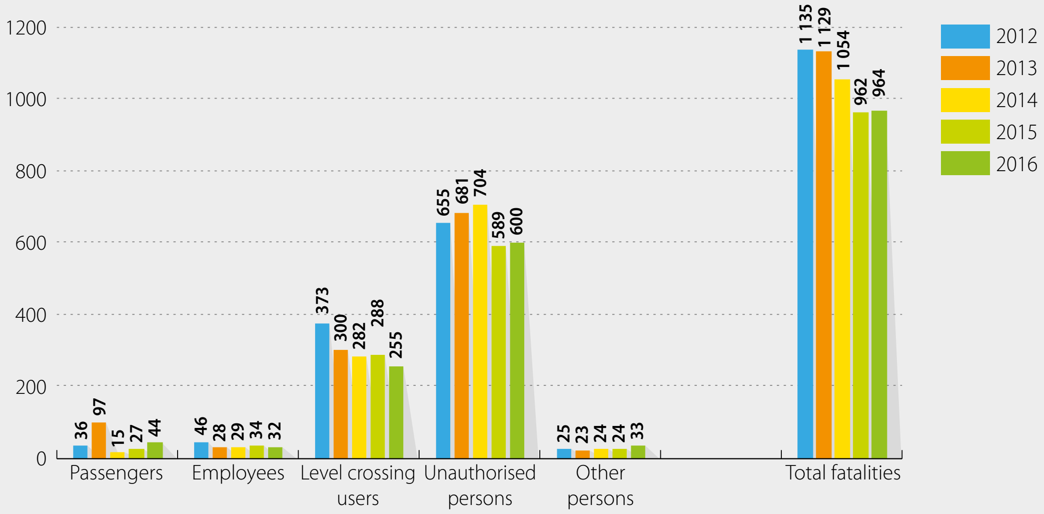
The trend in the number of passenger fatalities increased from 2014 (lowest value recorded) to 2016 (Figure 7). This represents a worrying statistic from the Agency's perspective.

As displayed in Figure 8, suicides continue to represent the largest share of the fatalities on railways (73%). From among the remaining categories, unauthorised persons hold the highest share, followed by level crossing users. The number of employee fatalities, which also include staff of contractors, various categories of staff such as track workers, train drivers and other train personnel represented in 2016 around 1% of the total number of fatalities. Persons strictly internal to railway operation (passengers, employees and other persons) represent less than 10% of persons killed on EU railways.

In 2016, the number of fatalities at level-crossing accidents represented 29% of railway fatalities (suicides excluded), while this accounts for only 1% of the road-user fatalities. Level crossing safety might therefore be perceived as a marginal problem by the road sector, while it is a key problem for the railways.

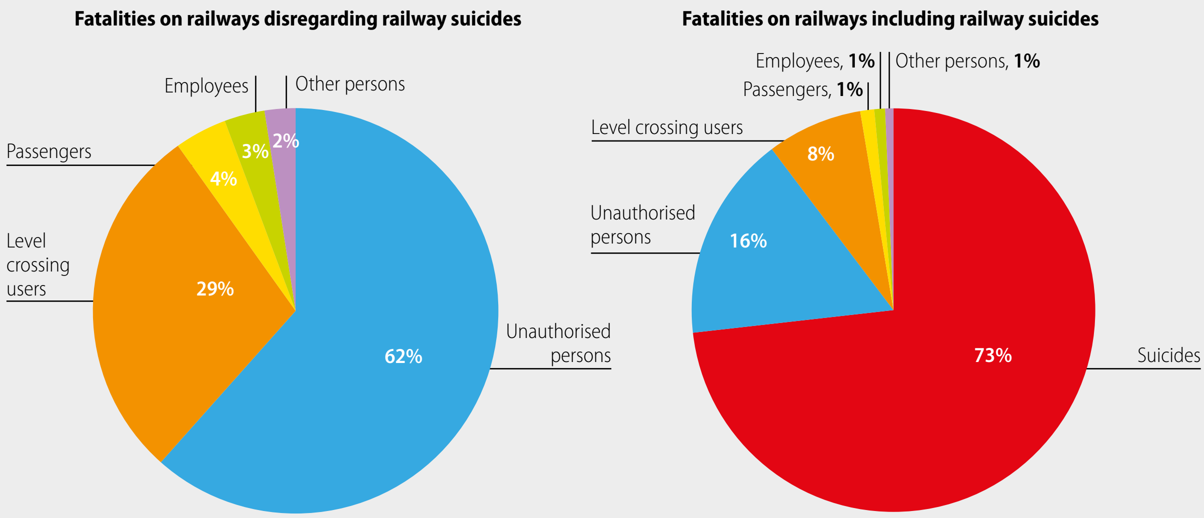
Figure 9 shows the general downward trend in the number of railway accidents with 5 or more fatalities and in the number of corresponding fatalities over the period 1980-2017, though in the last period a peak could be noticed in 2016, which is raising concerns for the Agency.

Figure 7: Number of fatalities per victim category, except suicides, EU 28, 2012-2016



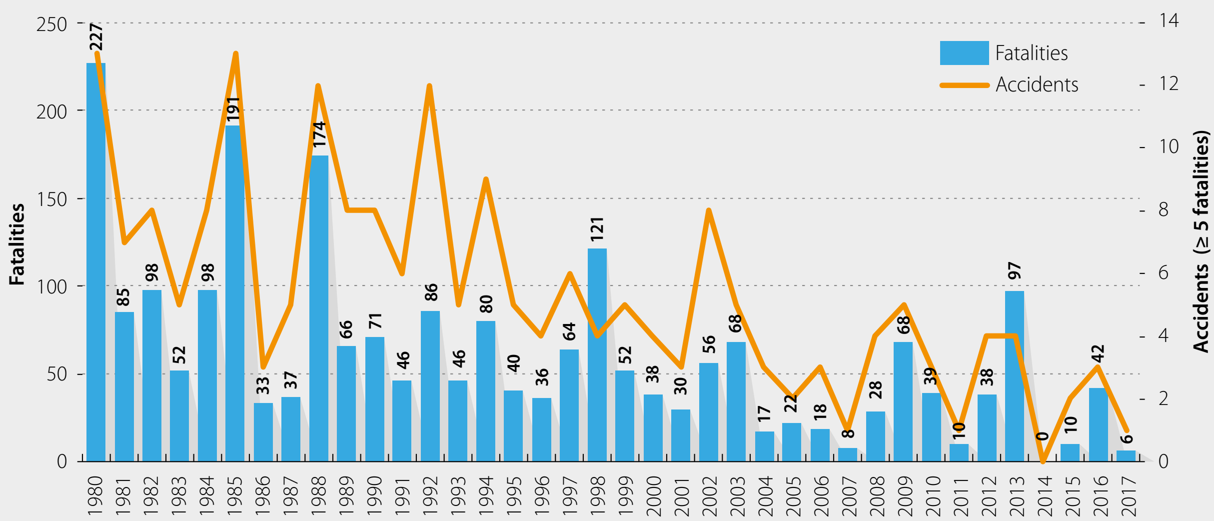
Source: ERAIL

Figure 8: Relative share of fatalities per victim category among all fatalities with (right) and without (left) suicides, EU 28, 2012-2016



Source: ERAIL

Figure 9: Railway accidents with five or more fatalities, Europe, 1980-2017



Source: ERAIL

SA 05 – Serious injuries from significant accidents

What does the indicator measure and why?

The indicator displays the number and trend of serious injuries occurring on railway premises in the SERA.

It is designed to help Member States in their tracking of continuous safety improvement, as set out in the Railway Safety Directive.

What is the desired target value?

There are no explicit desired target values other than to maintain or, where practically possible, to improve railway safety in the SERA.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency. While the numbers of fatalities is considered reliable, serious injury data are only fully harmonized from 2010.

What can we learn from the reported data?

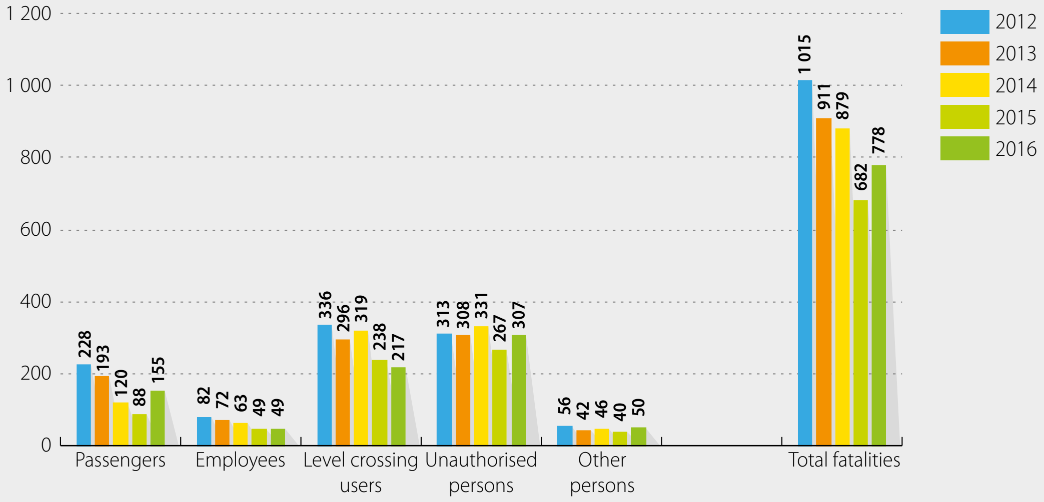
In 2016, there were 778 persons seriously injured in railway accidents in EU 28 countries, which represents a fall of just under 5.2 % (CAGR) from 2012 (Figure 10), although an increase is to be noticed in 2016 compared to the previous year. This increase is especially visible for passengers and unauthorised persons.

For all recorded years, there are high statistical correlations between significant accidents and fatalities and serious injuries (over 95%). Moreover, there is also a 92% causal association between the number of significant accidents and the number of fatalities and serious injuries. This is not surprising, as for an accident to be significant there has either to be fatalities or more than five serious injuries – hence the strong causal relationship. It will only be when we have better reporting, in the future, of all accidents that we will be able to determine the correlation and degree of causality more accurately.

In the ten-year period considered in Figure 11, the number of accidents with ten or more serious injuries never went beyond 3. The five-year moving average increased over the period 2010-2012, but has fallen consistently since then.

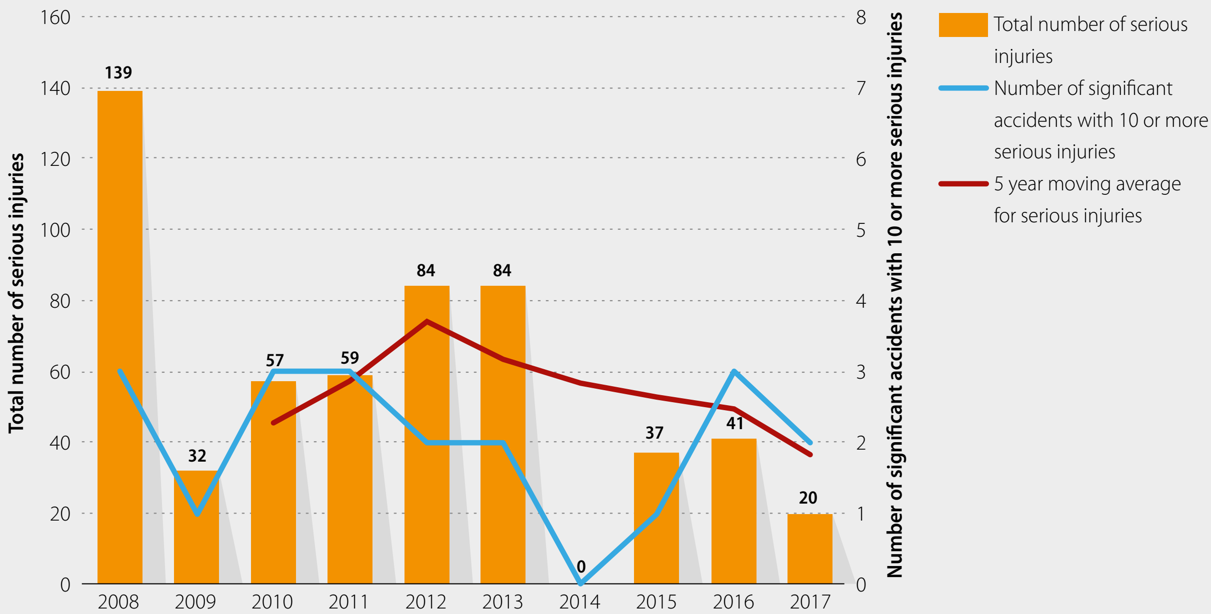
However, year 2016 marks a peak in the recent period as regards the number of significant accidents and corresponding serious injuries.

Figure 10: Total number of serious injuries per victim category, EU 28, 2012-2016



Source: ERAIL

Figure 11: Railway accidents with ten or more serious injuries, EU 28, 2008-2017



Source: ERAIL

SA 06 – Fatalities and serious injuries to passengers

What does the indicator measure and why?

The indicator displays the number of passenger fatalities and serious injuries over time and by country.

It is designed to help Member States in their tracking of continuous safety improvement, as set out in the Railway Safety Directive. Risks faced by passengers are an important consideration in the overall railway safety.

What is the desired target value?

There are no explicit desired target values other than to maintain or, where practically possible, to improve railway safety in the SERA.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency. While the numbers of fatalities is considered reliable, serious injury data are only fully harmonized from 2010.

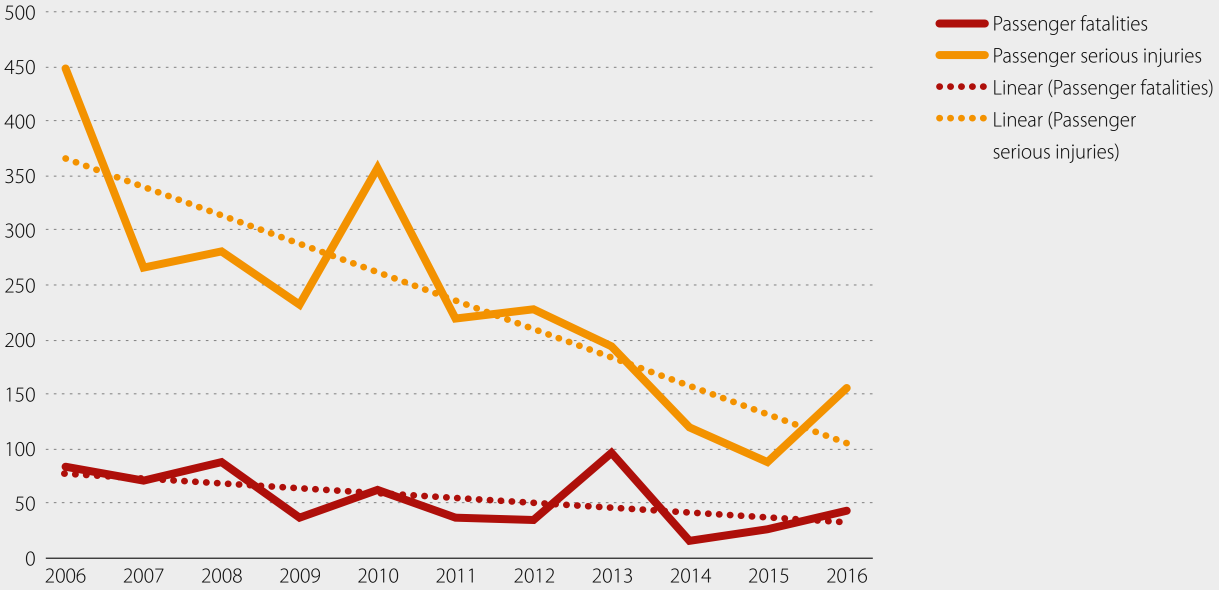
What can we learn from the reported data?

Figure 12 shows that both passenger fatalities and serious injuries have decreased over the period 2006-2016. For fatalities the rate of change over the period has been -5.6 % (CAGR) while the one for serious injuries has been nearly twice this, with a rate of change of -9.2 % (CAGR).

While the longer term has seen these downward trends, for both fatalities and serious injuries there have been increases in the shorter term. The increase from 2015 to 2016 poses particular concern.

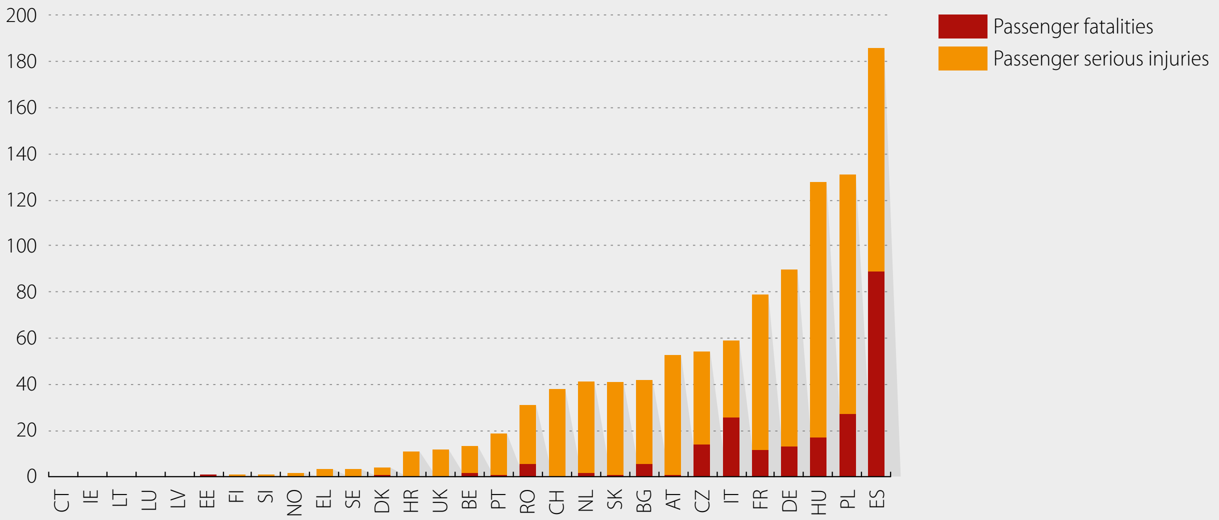
Figure 13 shows that Channel Tunnel, Ireland, Lithuania, Latvia, Estonia, Finland and Slovenia had no passenger fatalities and no serious injuries over the period 2012-2016. The countries with the highest numbers of passenger fatalities and serious injuries are Spain, Poland, Hungary, Germany and France.

Figure 12: Passenger fatalities and serious injuries with trend lines, EU 28, 2006-2016



Source: ERAIL

Figure 13: Passenger fatalities and serious injuries, by country in SERA, 2012-2016



Source: ERAIL

SA 07 – Fatalities and serious injuries to railway industry workers

What does the indicator measure and why?

The indicator depicts the number of fatalities and serious injuries to railway workers over time and by country.

The trend analysis is designed to help Member States in their tracking of continuous safety improvement, as set out in the Railway Safety Directive. As part of safety monitoring, it is important to focus on ensuring the safety of those who work in the railway industry across Europe.

What is the desired target value?

There are no published targets but there is the implicit expectation of having no worker fatality or serious injuries.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency.

What can we learn from the reported data?

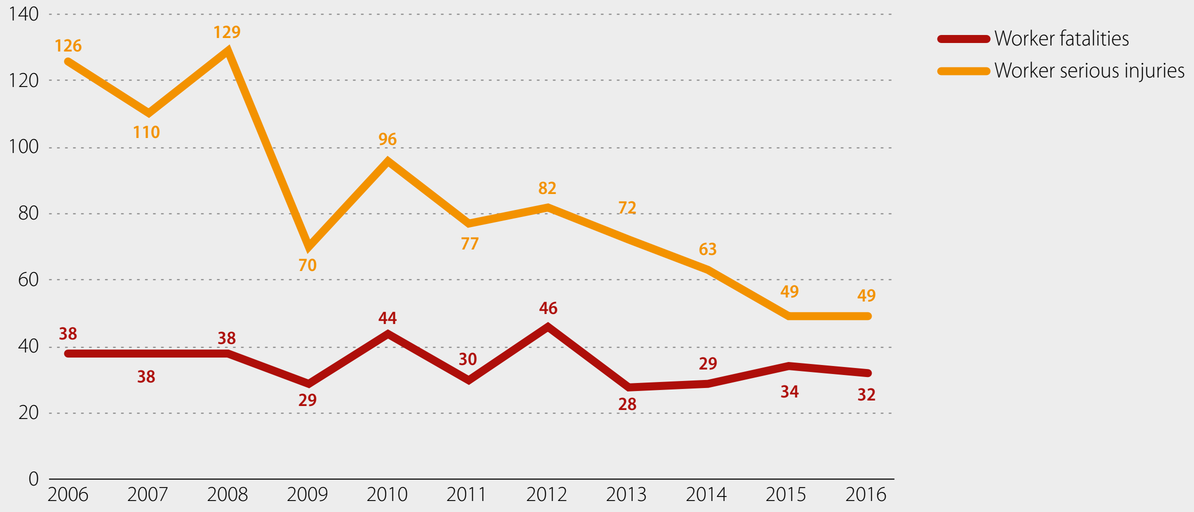
As shown in Figure 14, the number of workers seriously injured has fallen from 2006 to 2016 by 8.2 % (CAGR), while the number of fatalities fell by 1.5 % (CAGR).

However, the trend from 2013 to 2016 has seen an increase in the number of worker fatalities of more than 3.3 % (CAGR).

The analysis per Member State in Figure 15 shows that there are 10 Member States with outcomes worse than the EU 28 average. The top five Member States with the fewest workers killed or seriously injured over the period 2012-2016 are Ireland, Luxembourg, Portugal, Denmark and Estonia, while the least performing are France, Romania, Poland Austria and Germany.

Several Member States are considered to have strong safety management, safety leadership and a positive safety culture, yet the figures indicate otherwise. Given that workers are working in controlled environments, we would expect to see the development of initiatives to address the below average safety outcomes. We accept that the improvement cannot be achieved overnight but if the actors target to reduce the number of casualties and victims, then this needs to be achieved in the medium-term.

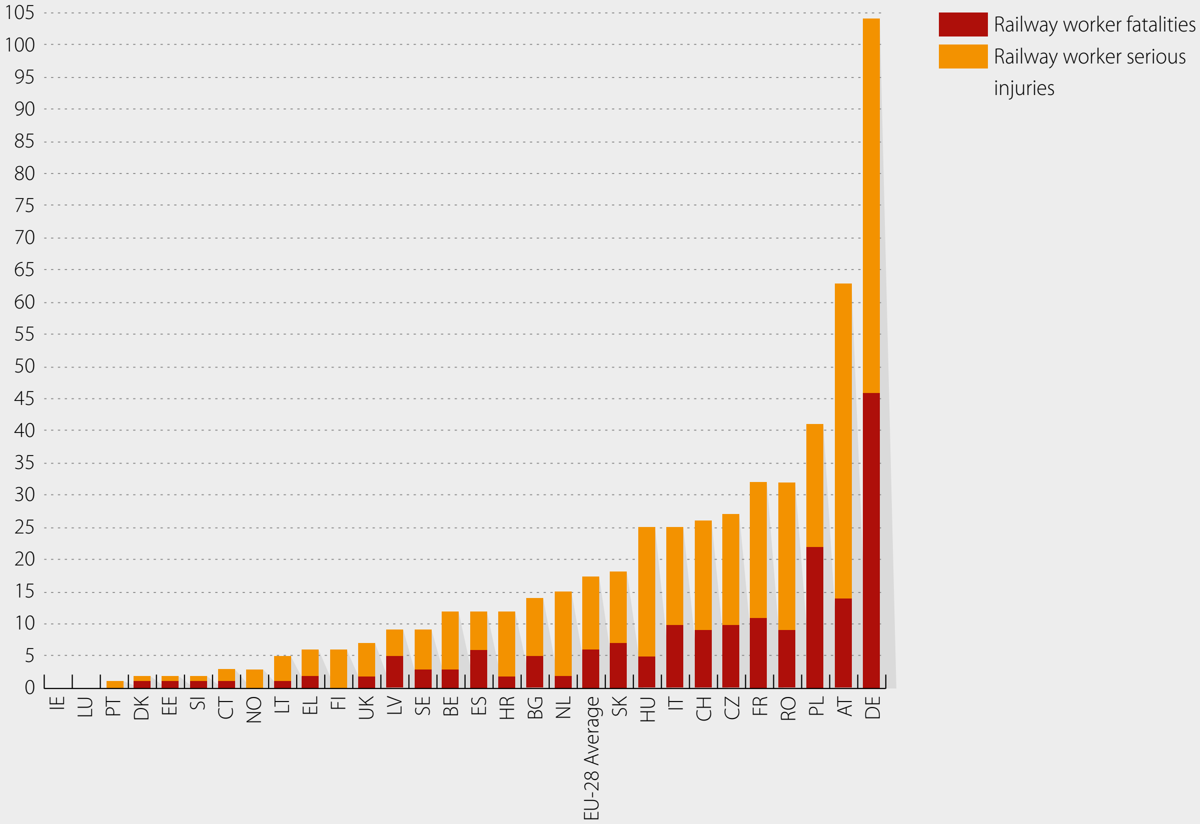
Figure 14: Fatalities and serious injuries to railway workers, EU 28, 2006-2016



Source: ERAIL

Note: Years 2006-2009 exclude Croatia

Figure 15: Fatalities and serious injuries to railway workers, by country in SERA, 2012-2016



Source: ERAIL

SA 08 – Accidents and incidents involving transport of dangerous goods

What does the indicator measure and why?

The indicator depicts the number of accidents and incidents involving the transport of dangerous goods and shows whether the accident or incident involved the release of those goods.

This is governed by the Convention for the International Carriage of Dangerous Goods by Rail (commonly referred to as RID) ([2]).

What is the desired target value?

The target is to have zero or as few accidents or incidents involving the transport of dangerous goods as possible.

How reliable is the data?

With the accumulation of CSI data, we are now able to look at where dangerous goods accidents (with and without releases) are occurring. We have updated the dangerous goods accident / incident data in 2016 to cover certain Member States that had previously missing data.

What can we learn from the reported data?

In 2016, Member States reported a total of 16 accidents involving dangerous goods of which eight involved a release of the dangerous goods being transported during the accident (Figure 16). The 16 accidents involving dangerous goods occurred in 8 EU Member States. The numbers noted for 2016 are not significantly different from the 2012-2016 average.

Ten Member States had no dangerous goods accidents during the period 2012-2016 – Croatia, Estonia, Greece, Hungary, Ireland, Luxembourg, Romania, Slovenia, Slovakia and the United Kingdom. The largest number of accidents took place in Germany, France, Poland, Lithuania and Latvia, where there were one or more accidents per year. In all other Member States and the Channel Tunnel there were one or few accidents per year over this period (Figure 17).

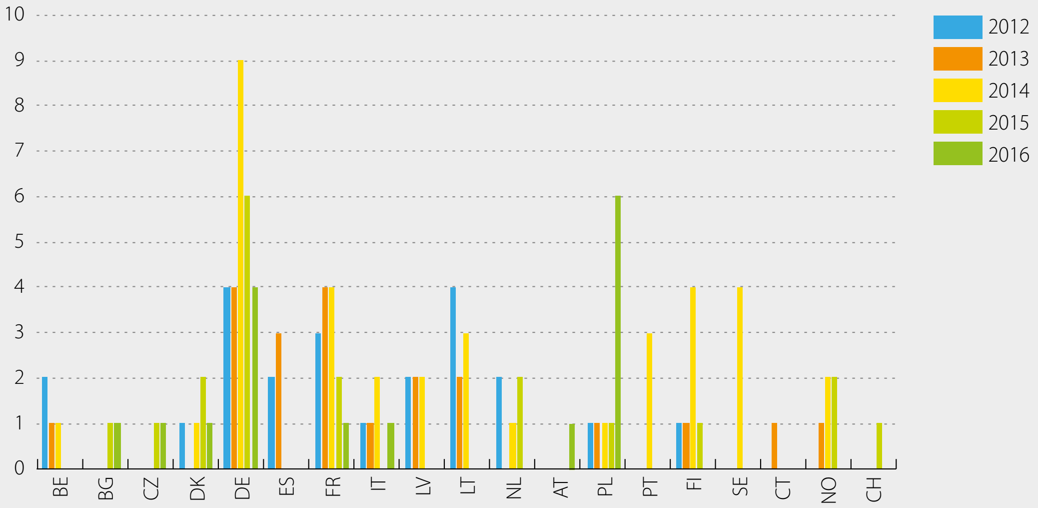
([2]) Regulation concerning the International Carriage of Dangerous Goods by Rail, appearing as Appendix C to the Convention concerning International Carriage by Rail (COTIF)

Figure 16: Railway accidents involving dangerous goods, EU 28, 2012-2016

	2012	2013	2014	2015	2016	TOTAL 2012 -2016	Average per year 2012 - 2016
Number of accidents involving at least one railway vehicle transporting dangerous goods in which dangerous goods are NOT released	13	9	17	7	8	54	12
Number of accidents involving at least one railway vehicle transporting dangerous goods in which dangerous goods ARE released	10	11	18	9	8	56	11

Source: ERAIL

Figure 17: Number of railway accidents involving dangerous goods (with and without release), by country in SERA, 2012-2016



Source: ERAIL

SA 09 – Suicides and unauthorised users on railway premises

What does the indicator measure and why?

The indicator depicts the number of suicides and unauthorised users occurring on railway premises over time and by country.

These are the basic safety indicators defining the type of "death by railway" from incidents as required by the Railway Safety Directive.

What is the desired target value?

There are no explicit desired target values other than to reduce the numbers of all such incidents to persons occurring on railways in the SERA.

How reliable is the data?

Data is supplied to NSAs by the Police, Coroner's Courts or other Judicial Bodies. From the judicial determination, e.g. Suicide or Unauthorised User, the NSAs supply this data to the Agency and it is stored in the ERAIL database. Its quality and completeness thus depend on the quality of inputs by the bodies supplying the data to the NSAs.

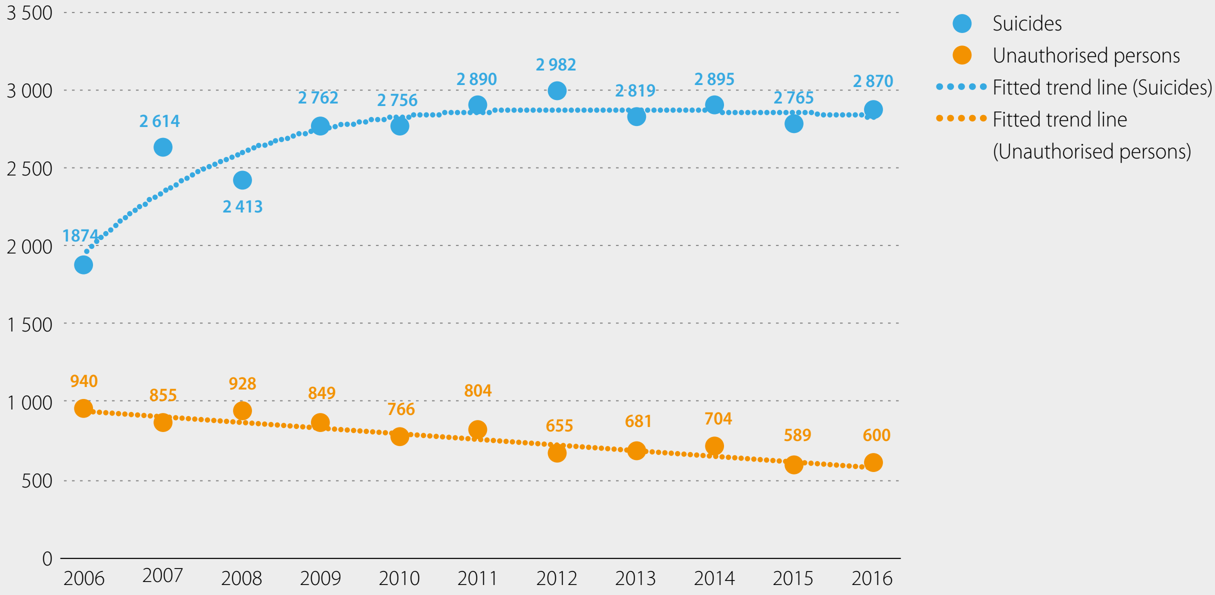
What can we learn from the reported data?

Figure 18 shows that there is a downward trend for unauthorised persons fatalities, though not so strong and even switched from 2015 to 2016. The trend in suicides is more complex and not so clear, though it appears to have stabilised at just under 3000 per year over the period 2012-2016.

Different decision-making criteria and processes can result in under- and over-reporting of suicide fatalities in different Member States. Despite the possible classification problems, a falling trend can be observed since 2012 with a decrease of 0.76 %.

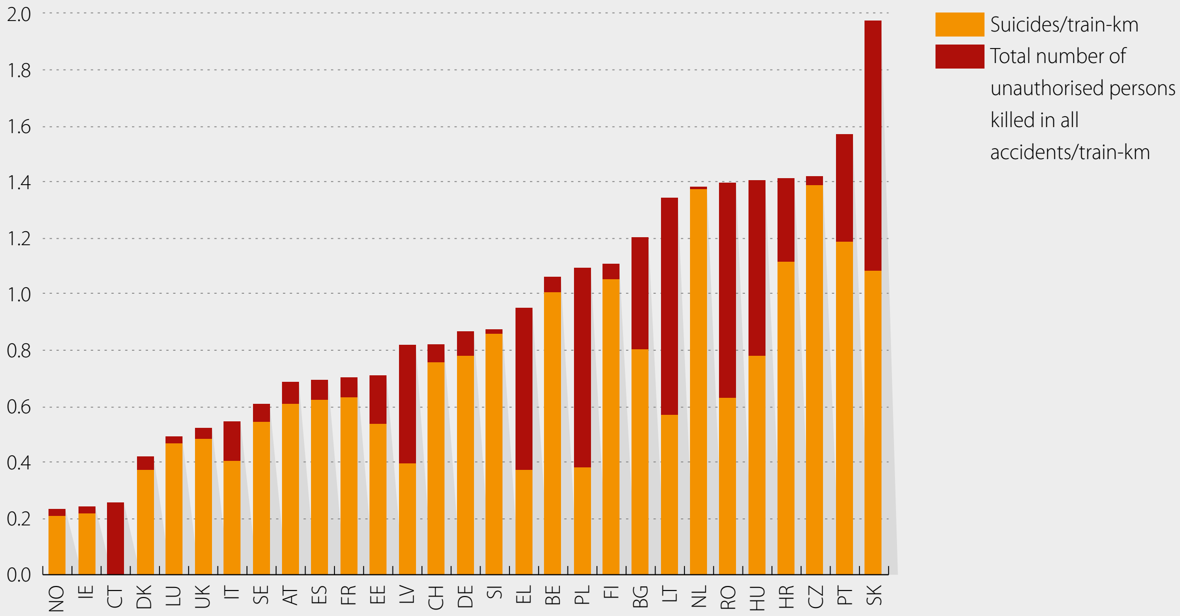
Figure 19 displays normalised data per million train-km, per country and shows a strong variation both between countries, but also as regards the proportion between suicides fatalities and unauthorised persons fatalities per million train-km.

Figure 18: Suicides and unauthorised persons railway fatalities, EU 28, 2006-2016



Source: ERAIL
Note: Data not available for Croatia in the period 2006-2009 and for Luxembourg in the period 2006-2008

Figure 19: Suicides and unauthorised persons railway fatalities per million train-km, by country in SERA, 2012-2016



Source: ERAIL

SA 10 – Precursors to accidents

What does the indicator measure and why?

Precursors to accidents are incidents that, under other circumstances, could have led to an accident. The indicator depicts the number of precursors occurring on the railways by year in the EU. The precursors reported to the Agency are: broken rails, track buckles, signals passed at danger, wrong-side signalling failures, broken wheels and broken axles.

This is a basic safety indicator required by Railway Safety Directive.

What is the desired target value?

There are no explicit desired target values other than to reduce the numbers of all such precursor incidents occurring on railways in the SERA.

How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency. While the reporting of the precursor occurrences is undoubtedly useful, the Agency currently has very limited ability to assess the quality or consistency of reporting of these events. With that in mind, some of the changes illustrated in the next figures may reflect a change in reporting practices rather than the apparent significant changes in underlying risk.

What can we learn from the reported data?

Figure 20 shows that the total number of precursor incidents increased by 5.4 % (CAGR) over the period 2012-2016. This increase has been driven in part by the numbers of signals passed at danger, broken rails, but principally by the very significant increase in track buckles (a CAGR over the whole period 2012-2016 of 15.7%). Some of these increases may be due to better reporting of the precursor events.

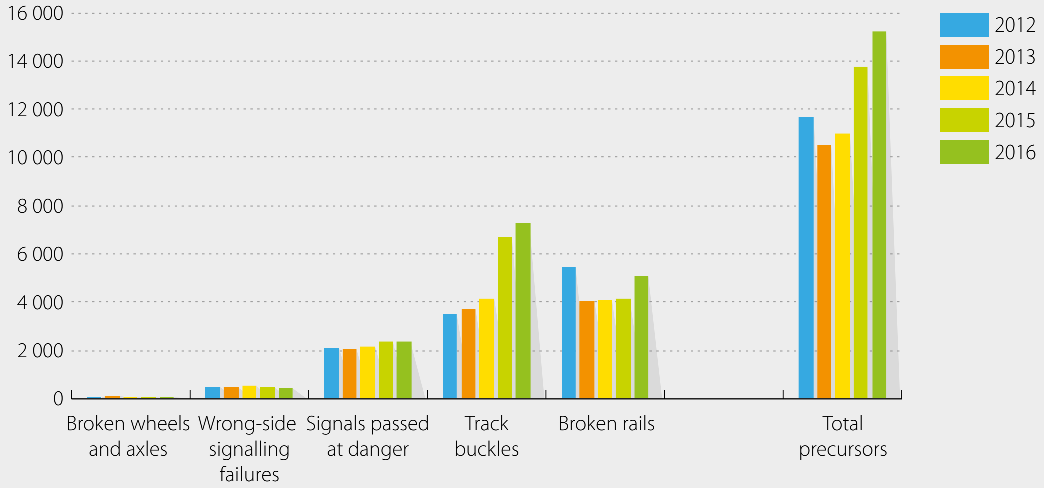
Figure 21 shows the number of track buckles reported in 2016 by country in SERA. Buckling of the track is primarily driven by extremes of temperature. Poor maintenance, reductions in the levels of maintenance and the use of different or inappropriate materials (as a way of reducing infrastructure costs) may also contribute to these changes. The Agency has started to work with NSAs to share the analysis of this data and to understand how these risks are being addressed through targeted supervision and RU and IM improvement measures.

However, some of the values in the graph should be read with caution. Of note is the situation in Italy, where separate analysis has shown that the figures are also influenced by the definition used for this precursor [3]. Further analysis and discussions are intended to take place with Italy on this subject, considering that the number reported increased from below 2000/year in the period 2012-2014 to more than 4000 in 2015 and more than 5500 in 2016.

The Agency's project to develop Common Occurrence Reporting across Europe, which may include an increase in the categories of mandatory reporting, is likely to support an increase in data quality and consistency.

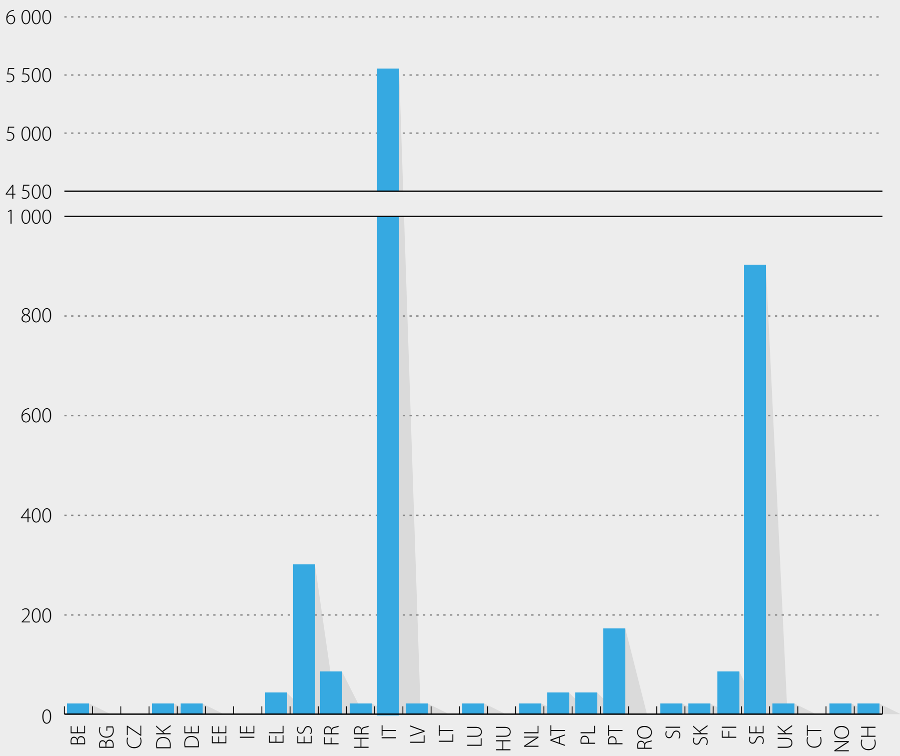
([3]) The definition used is very general: *"track buckles and other track misalignment" means any fault related to the continuum and the geometry of track, requiring track obstruction or immediate reduction of permitted speed*. Track geometry is collected by a measurement train which marks track faults which then have speed restrictions imposed them.

Figure 20: Number of precursors to accidents, EU 28, 2012-2016



Source: ERAIL

Figure 21: Number of track buckles by country in SERA, 2016



Source: ERAIL

SA 11 – Safety related to level crossing infrastructure

What does the indicator measure and why?

The indicator measures the numbers of fatalities and serious injuries occurring in level crossing accidents, as well as the magnitude and severity per level crossing accident using the Fatality and Weighted Serious Injury (FWSI) divided by the number of accidents by country in SERA.

As shown by indicator SA 04, fatalities and serious injuries in accidents at level crossings constitute an important proportion of the total number of victims.

What is the desired target value?

There are no target values other than to maintain safety levels or, where practicable, improve the safety in the SERA.

How reliable is the data?

Whilst data was collected for some Member States before 2010, some did not record this data. From 2014 there was a revision of definitions concerning the classification of level crossings. The 2014 break in the level crossings has only a minor effect on the indicator.

What can we learn from the reported data?

Figure 22 shows that at the EU 28 level there has been a steady improvement in level crossing safety over the period 2010-2016.

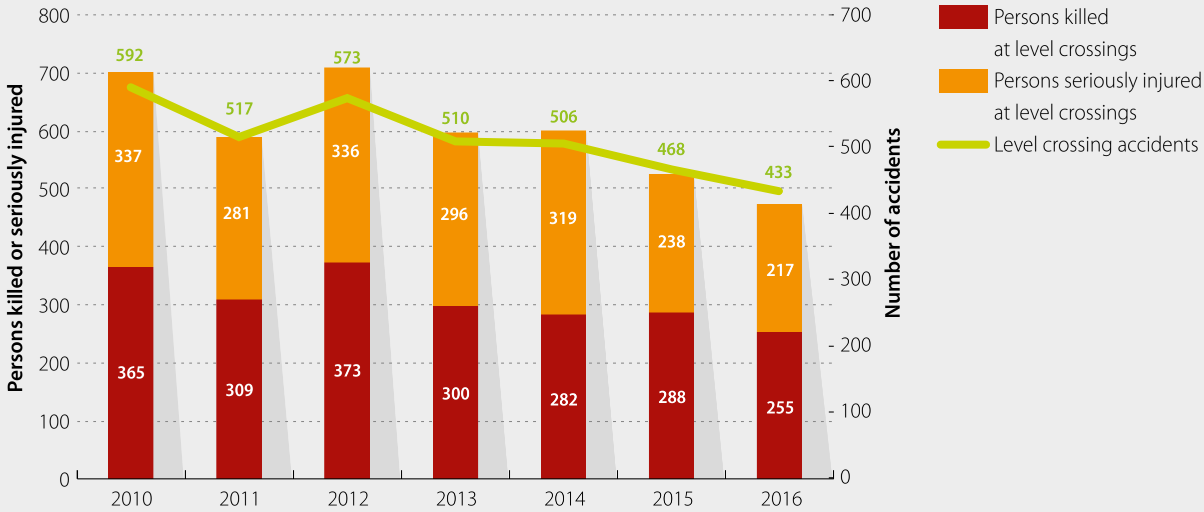
This is a result of actions undertaken by infrastructure managers to address level crossing accidents. Such initiatives include the removal of level crossings and their replacement by either underpasses or bridges, traffic management and signage initiatives, increasing crossing visibility, driver and other educational programmes to help all level crossings users have a better understanding of the safety risks associated with crossings.

In Figure 23 the FWSI per level crossing accident are shown by country in SERA. The data examines the CSI for 2016 against the average for the two five year periods 2015-2011 and 2014-2010. The Channel Tunnel (CT) has no public level crossings on its infrastructure (hence a zero entry).

The best performers in 2016 were Ireland, Norway, Estonia, Luxembourg and Belgium. The least performing Member States in 2016 were Finland, Bulgaria, Portugal, Latvia, Greece, Denmark, and Spain. All of these Member States had poorer outcomes than their two previous five-year averages, which poses significant concerns and flags the potential need for more substantiated actions.

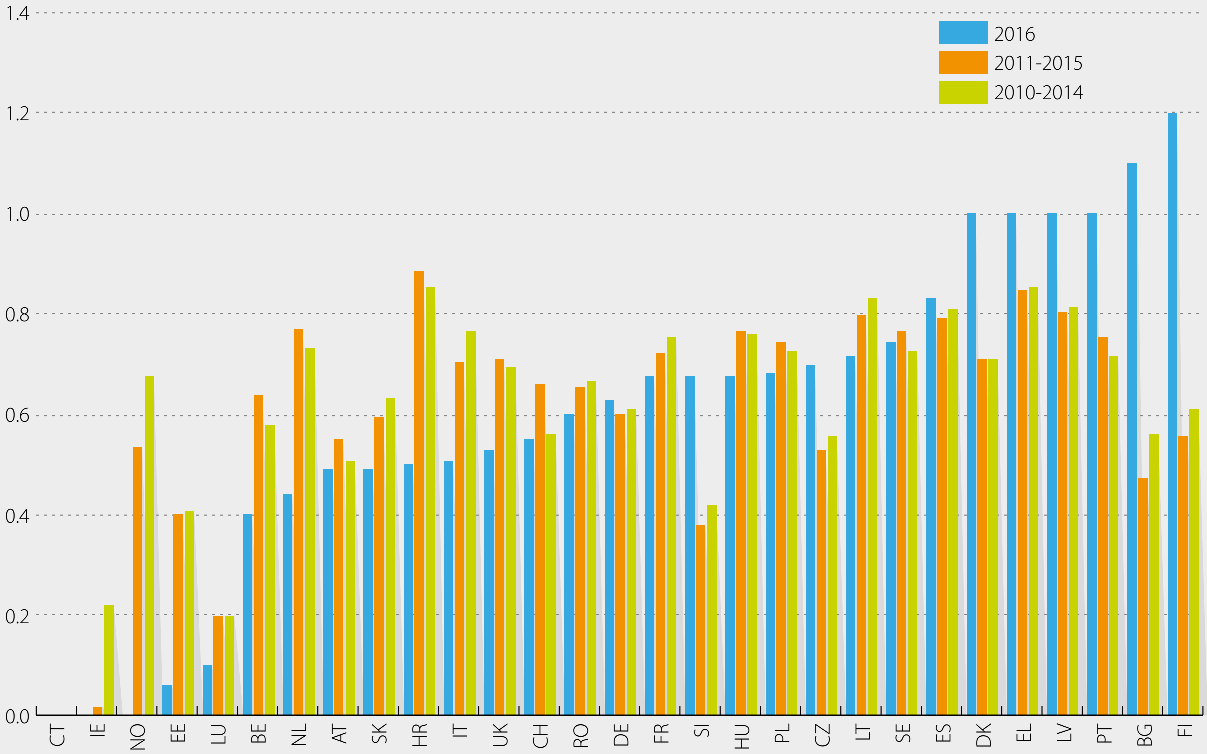
The Agency could play a role in analysing the scope for technical and operational harmonisation for level crossings. More awareness and focus on level crossing safety can be raised together with the European Commission over the next period based on such analyses. These could allow for an integrated view rail-road and for identifying remedial infrastructure measures.

Figure 22: Number of fatalities and serious injuries in accidents at level crossings, EU 28, 2010-2016



Source: ERAIL

Figure 23: Number of FWSI per accident at level crossings by country in SERA for 2016 compared to the 5 year averages 2011-2015 and 2010-2014



Source: ERAIL

SA 12 – NSA performance review reporting (qualitative)

What does the indicator measure and why?

The indicator looks into the reporting by NSAs of the safety issues they deem to be important and used in establishing their safety priorities and thereby developing their safety culture. This is the first year that such an analysis has been undertaken. In the course of time the Agency will attempt to build a picture allowing the development of qualitative and quantitative analyses around this indicator.

What is the desired target value?

N.a.

How reliable is the data?

The NSAs have to submit their Annual Reports to the Agency by 30th September of the year following the reporting year. At the moment reports have variable reliability. A new reporting "protocol" will be developed in conjunction with the NSAs.

What can we learn from the reported data?

Figure 24 displays issues of concern for NSAs as evidenced by quotes from the annual safety reports.

Figure 25 depicts examples of best practice as evidenced by quotes from the NSAs annual safety reports.

The Agency is currently implementing an ambitious programme to promote a positive safety culture across European railways. It aims at raising awareness of, improving, evaluating railway safety culture and enhancing just culture. The programme relies on the expertise of the Agency's safety culture team and the work conducted under the Human and Organisational Factors Network of the Agency.

Figure 24: Issues of concern for NSAs as evidenced by quotes from the annual safety reports

Topic	Issue
Level Crossing accidents and SPADS	They were identified as major safety issues for many NSAs.
Human Factors	It is an area of concern and there were several mentions of the use of social media distracting train drivers.
Safety Culture	It is an area of focus for several NSAs - "Common causes behind safety-related incidents associated with track work include incompetence and a poor safety culture. Incompetence leads to incorrect procedures, and a poor safety culture results in instructions being ignored and incorrect procedures being accepted."
Competence of contractors	It is a problem. "One of the most important causes of safety issues in track work in recent years has been a shift towards contractors outsourcing more and more of their work to subcontractors and hired labour. The nature of the safety-related incidents shows that subcontractors and hired labour lack a safety culture, competence, and understanding of the railway system as a whole."
Competent resources internally	Lack of competent resources internally: • "Limited supply of proper CSM-RA competencies on the market." • "It has been difficult to fill the posts due to an eminent lack of engineers, even of those without specific knowledge of the railways."
Risk management	It is still not completely understood - "Some railway companies still need to fully implement risk-based safety management starting with their own risk profile. It has been detected that the companies are experiencing challenges in the implementation of the EU-rules passed last year."
Unauthorised persons/suicides	The proportion of suicides changes dramatically for each Member State. It means that it is necessary to work at the European level on a definition of common suicide criteria for statistical records and outline it for the EU institutions.
Verification of Data	It can be difficult to verify whether someone has been seriously injured as the police sometimes lacks information about hospitalisations. If there is no information about the severity of the injury the data is classified under "slightly injured.
Trend analyses	Small numbers can have a big effect leading to a certain degree of statistical uncertainty and making trend analyses difficult.

Figure 25: Examples of good practice as evidenced by quotes from the NSAs annual safety reports

Topic	Good Practice
External Education	Several NSAs organise education programmes in schools e.g. "Railway ABC" focussing on the appropriate behaviours to adopt around railway premises. Multimedia presentations, competitions, quizzes and crosswords to help children learn and remember appropriate safety behaviours.
Training	Free training courses and workshops for all market entities responsible for rail safety.
Communication	Dedicated "hotline" where all concerns and complaints related to rail traffic safety can be reported (as well as by e-mail or post).
Prevention measures	Anti-trespass grids are being used as a measure to prevent unauthorised persons on railway premises.

SA 13 – NIB notified investigations

What does the indicator measure and why?

The indicator captures the number of National Investigation Bodies (NIB) investigations opened, as well as the investigations reported over time, in line with the requirements of the Railway Safety Directive.

What is the desired target value?

No target value is envisaged, though it is desirable that the time lag between the notification of the occurrence and the reporting date is not too long.

How reliable is the data?

Data is supplied by the NIBs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NIBs with verification by the Agency.

What can we learn from the reported data?

Since 2006, on average 195 accidents and incidents per year have been investigated by NIBs of Member States (Figure 26).

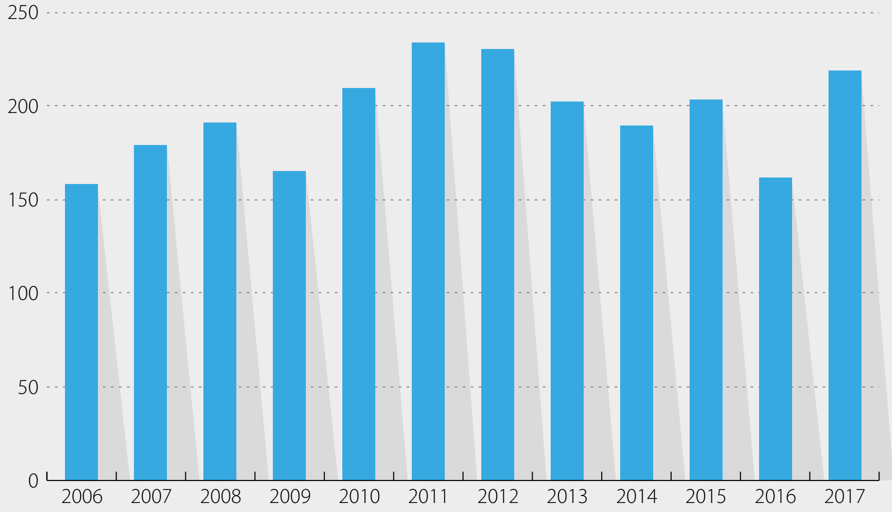
Without further research, it is not possible to say whether the short-term and longer-term variations are related to:

- Improved safety, i.e. a reduction in the number of serious accident or incident occurrences;
- Concentration by the NIBs on serious accident occurrences (and not on "near miss" occurrences);
- Issues relating to the ERAIL system, e.g. inputting of data related to occurrences, or
- Other reasons, e.g. new staff within NIBs not yet fully trained in the requirements for reporting.

Figure 27 shows that over the period 2012-2017, the percentage share of investigations that were closed during the year following the occurrence was 61 % and 80 % for those closed after two years. It is of serious concern, however, that a number remain to be finally reported and closed after 5 years is just under 5%.

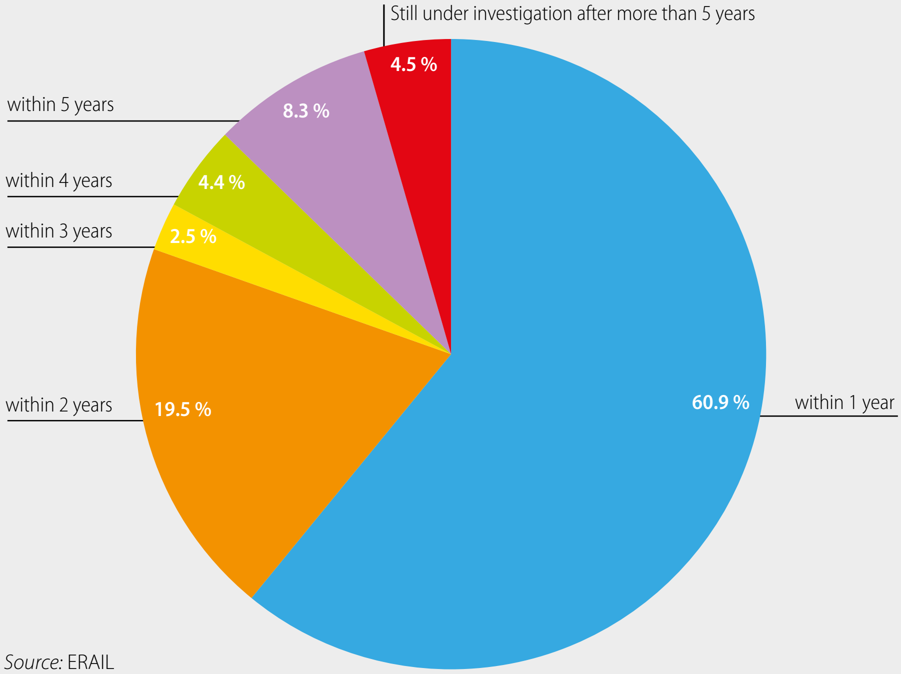
The Agency has previously underlined the benefit of producing quick reports on accidents and publishing the findings in order to maximise the learning and improvement that might be possible following an accident. Moreover, over the next period, the Agency will analyse the content of the NIB reports in order to understand if there are recurring recommendations over time and from country to country. This could be an indication of the areas where further actions may be needed.

Figure 26: NIB investigations opened for serious accident or incident occurrences notified in ERAIL, 2006-2017



Source: ERAIL

Figure 27: NIB occurrence investigations reported, by lag of reporting, 2012-2017



Source: ERAIL

SA 14 – Train Protection System (TPSs)

What does the indicator measure and why?

The indicator shows the deployment of the Train Protection Systems (TPS) ([4]) on the EU railways. It is a basic safety indicator defining the safety of railway infrastructure as required by the Railway Safety Directive.

What is the desired target value?

There are no explicit desired target values other than to maintain or improve, where practicable, the safety levels on railways in the SERA. However, the higher the functionality provided by the TPS, the better for the safety of railway operation.

How reliable is the data?

Data is reported by IMs to NSAs, which in their turn report them to ERA via ERAIL-CSI database. Its quality and completeness thus depend on the quality of inputs by IMs, the data quality check by the NSAs and by the Agency.

Given the myriad of options and versions of train protection systems in the EU, a classification focusing on three levels of assistance provided to the train driver provides a solid basis for reporting comparable statistical data. At the same time, the data have only been reported for two years now.

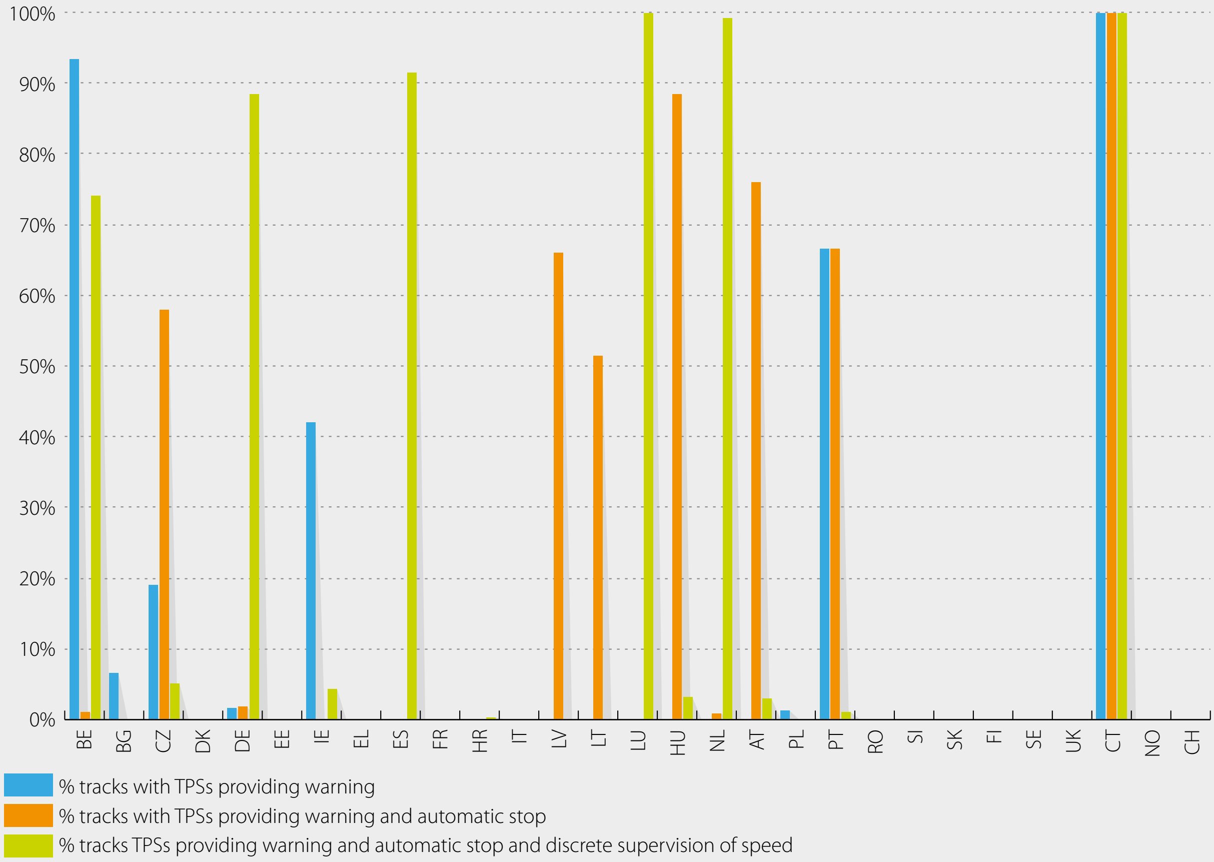
What can we learn from the reported data?

Installation of TPSs is widely considered to be one of the most effective railway safety measures to reduce the risk of collisions between trains on mainline railways. The penetration of these systems in the national railway network and their use is shown in Figure 28. While data were not reported by four MSs, six MSs reported zero values across all three TPSs functional levels, whereas in some of them, the ETCS system had been in place.

The reported data reflect infrastructure safety standards of single countries, notably the functional capability of the legacy (national) signalling system. In some instances, the implementation of ETCS system, corresponding to the TPS level, which provides the maximum level of assistance to the driver, is visible in the figures.

([4]) A system that helps to enforce obedience to signals and speed restrictions with warning, warning and automatic stop or warning, automatic stop and discrete stop supervision

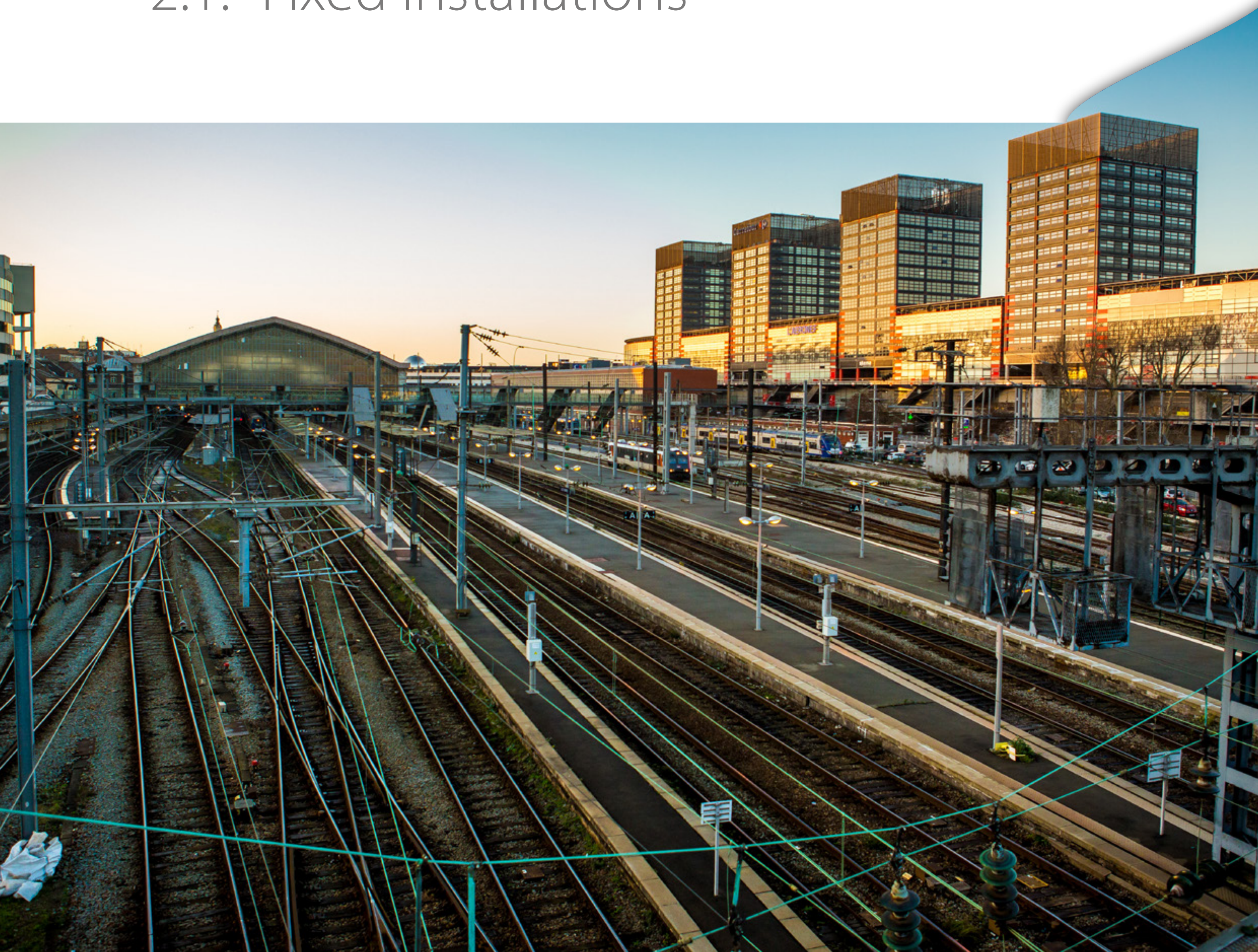
Figure 28: Percentage of main tracks equipped with TPS, by country in SERA, 2016



Source: ERAIL-CSI

2. Progress with Interoperability

2.1. Fixed installations



FI 01 – Trackside infrastructure conforming to INF TSI and ENE TSI

What does the indicator measure and why?

The indicator measures the deployment of the fixed installations TSIs (INF, ENE) and gives an indication of the degree of convergence of the trackside infrastructure towards the harmonized technical specifications from the TSIs.

What is the desired target value?

It is expected that, within a sufficient time horizon, the trackside infrastructure which falls under the scope of the Interoperability Directive, would be entirely TSI compliant. This is however a long process, considering that TSIs may apply only to new infrastructure and to upgrades/renewals and the latter occurs seldom due to the normally long life cycle of railway infrastructure, on one hand, and the limited budgets for investments, on the other.

How reliable is the data?

Data is based on the answers to the NSA Survey launched by the Agency in 2018. The completeness and quality of this data relies on the input provided by the NSAs. Eighteen NSAs have provided answers to this question; out of those, seven have reported a 0 value for this indicator.

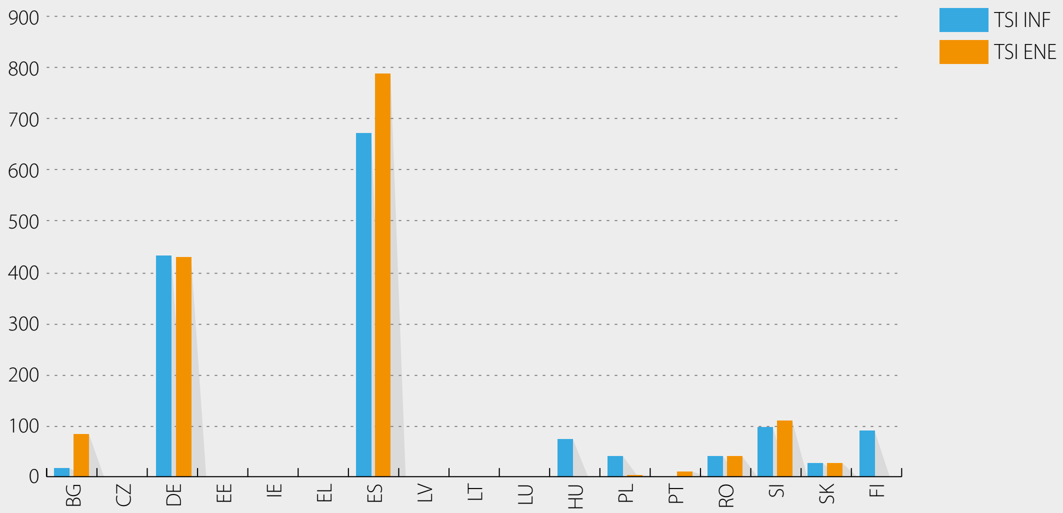
What can we learn from the reported data?

As can be noticed from Figure 29, the progress in the deployment of INF and ENE TSIs over the period 2015-2017 is very slow. Small numbers are to be noticed and only in some of the SERA countries.

Rather than being considered as a measure of limited progress with interoperability, this is normally a function of emerging needs (opening of a new line or upgrade/renewal) and of the financing availability for such investments in the various Member States.

While we acknowledge that the progress shown by this indicator is slow, the Agency will continue to monitor this and depict the magnitude of this progress until full TSI compliance.

Figure 29: Length of trackside infrastructure (km) conforming to INF TSI and ENE TSI, 2015-2017



Source: NSA Survey
Note: Countries not included in the graph have not reported any value.

FI 02 – Non-applications of fixed installations-related TSIs

What does the indicator measure and why?

The indicator measures the number of derogation requests for the fixed installations related TSIs (INF, ENE, SRT and PRM), as submitted by Member States. All requests for derogations received by the EC are counted, except those which were rejected.

These derogations refer to infrastructure projects in general and concern either a single railway line or even an area of a network depending on the geographical scope of the derogation.

These derogations represent technical barriers for vehicles because vehicles have to be compliant with these derogations (additional national technical rules) in addition to the TSI requirements.

What is the desired target value?

The lower the number of derogation requests, the higher the level of interoperability in Europe is.

How reliable is the data?

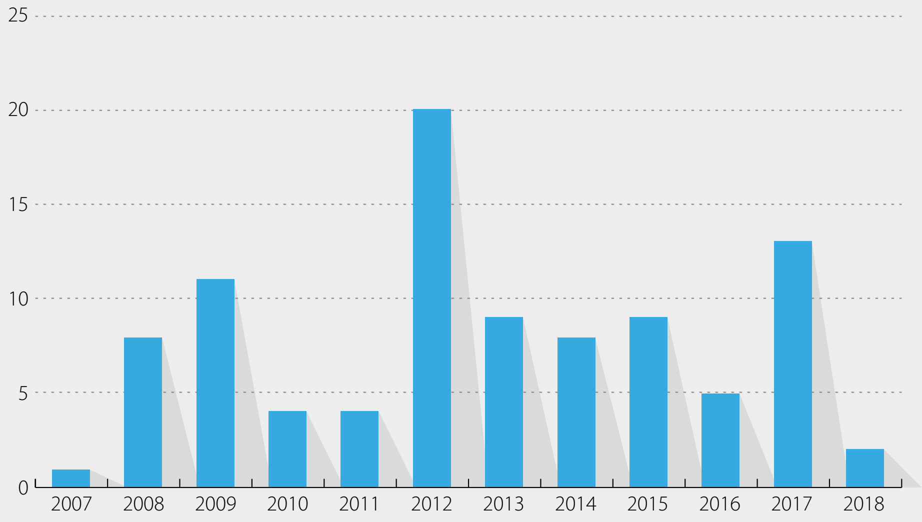
The data is directly retrieved from an internal database of the European Commission where all submitted derogation requests are recorded.

What can we learn from the reported data?

The overall trend displayed in Figure 30 could be an indication of a stable technical specification, assuming that the number of infrastructure related projects per year did not decrease over the years, with a recent peak in 2017.

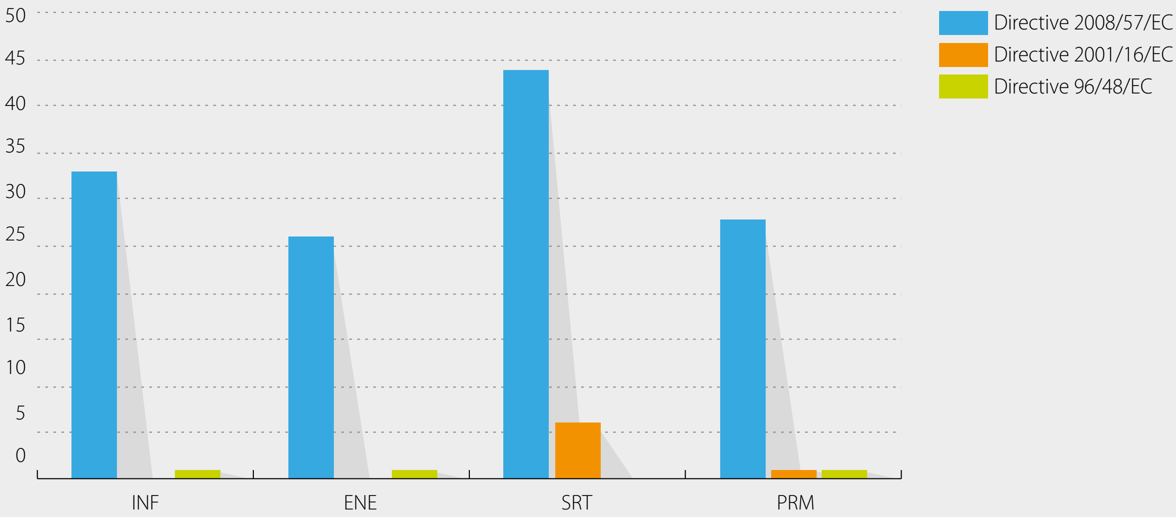
The TSI derogations concern most frequently the SRT TSI followed by INF TSI and PRM TSI (Figure 31).

Figure 30: Derogations from fixed installations-related TSIs (INF, ENE, SRT, PRM), SERA, 2007-2018



Source: EC internal database

Figure 31: Derogations from fixed installations-related TSIs by category and the reference Directive, SERA, 2007-2018



Source: EC internal database

FI 03 – Core network equipped with ETCS and GSM-R

What does the indicator measure and why?

The indicator shows the proportion of the Core Network Corridors being operational with European Train Control System (ETCS) and Global System for Mobile Communications - Railway (GSM-R) as of 1 May 2018.

ETCS and GSM-R are at the heart of the European strategy for interoperable railways. Their progressive implementation is needed to assure all its benefits.

What is the desired target value?

The target value is that 100% of the Core Network Corridors are equipped with ERTMS by 2030.

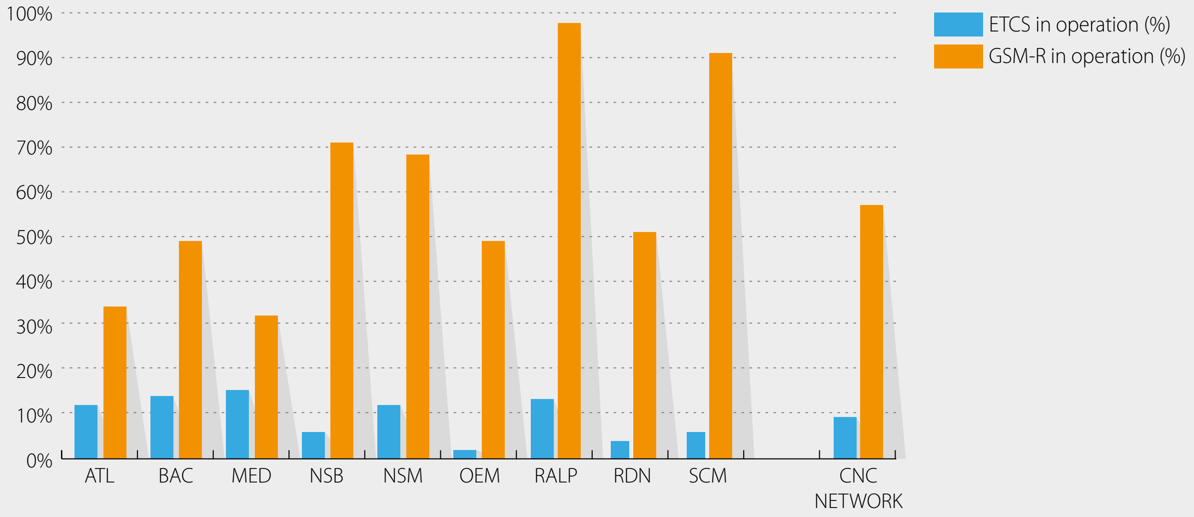
How reliable is the data?

Currently, the data is collected by the Deployment Management Team (contractor of DG MOVE) using the TEN-tec database. The data reliability is estimated to be high. In the future, the Register of Infrastructure (RINF) will be used to retrieve this data.

What can we learn from the reported data?

As shown in Figure 32, the level of ETCS deployment on the Core Network Corridors, as of 1st May 2018, is relatively low (9%) compared to the level of GSM-R deployment (57%). Based on the ERTMS European Deployment plan, an intermediate target value is set at 31% of the Core Network Corridors to be equipped with ETCS by 2023. This represents a challenge given the current level of ETCS deployment on the Core Network Corridors.

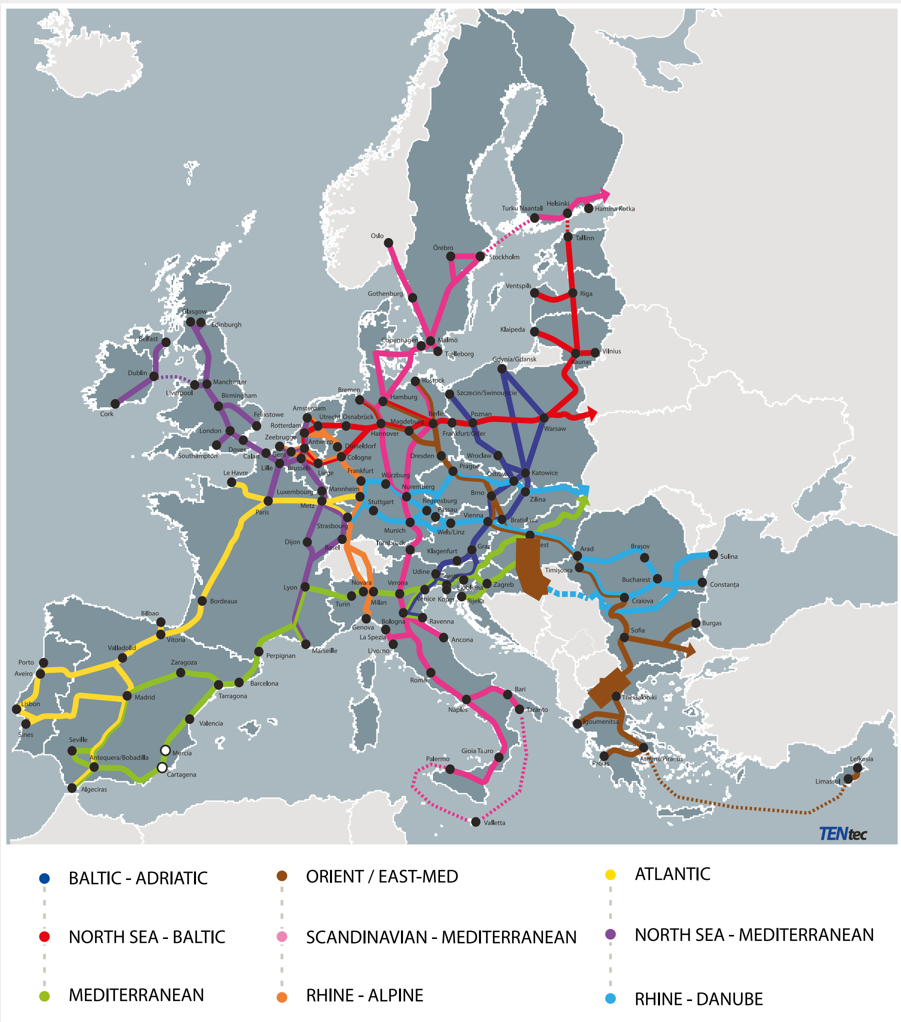
Figure 32: Percentage of core network corridors equipped with ETCS and GSM-R in operation in SERA as of 1 May 2018



Source: TENtec database

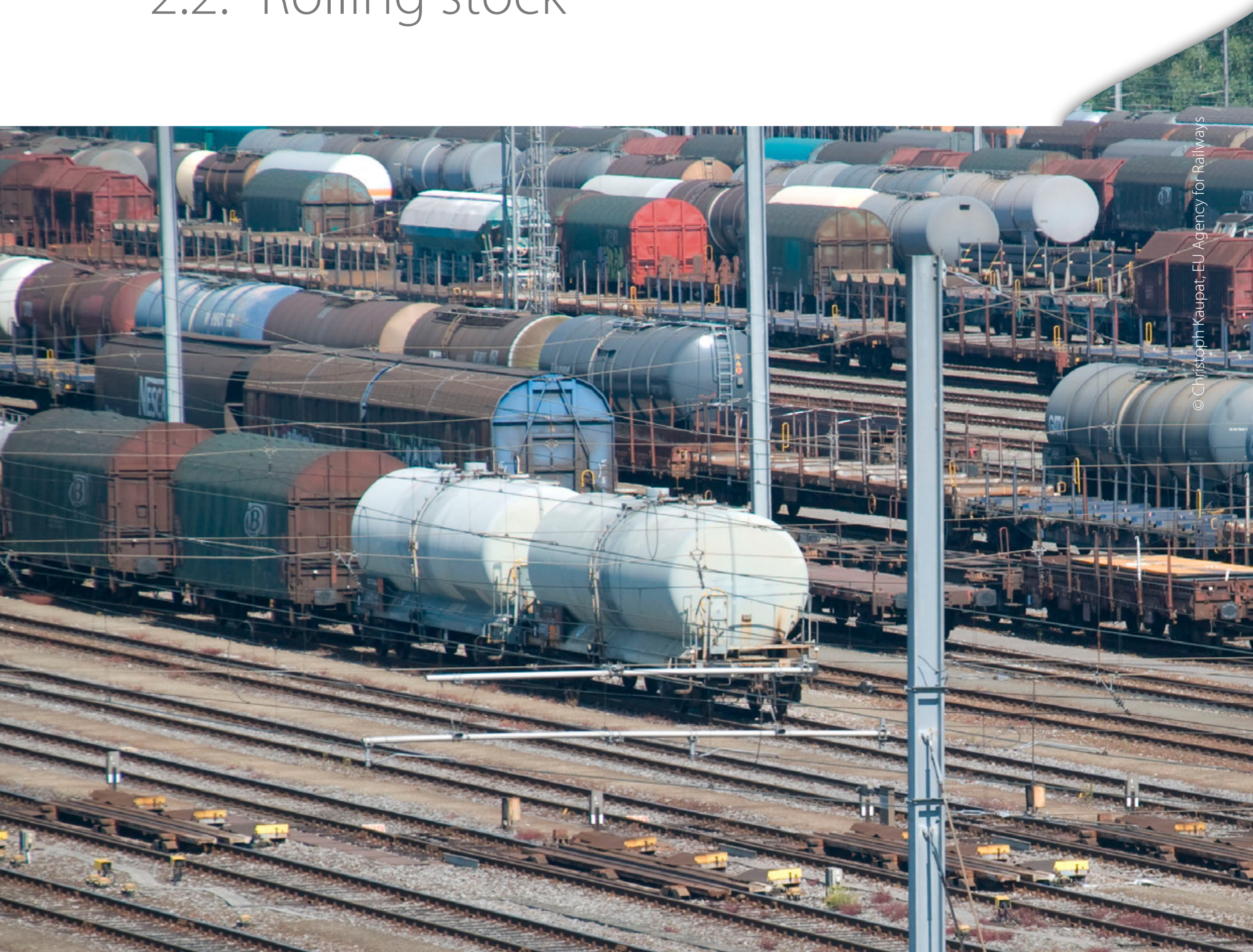
Notations: ATL=Atlantic Corridor, BAC= Baltic-Adriatic Corridor, MED=Mediterranean Corridor, NSB=North Sea-Baltic Corridor, NSM=North Sea-Mediterranean, OEM=Orient/East-Med Corridor, RALP=Rhine-Alpine Corridor, RDN=Rhine-Danube Corridor, SCM=Scandinavian-Mediterranean Corridor

Figure 32a: Core Network Corridors, SERA



Source: European Commission, DG Move, TENtec Information System

2.2. Rolling stock


© Christoph Kaupat, EU Agency for Railways

RS 01 – Evolution of the applicable NTRs for vehicles

What does the indicator measure and why?

The indicator captures the state of play as regards the publication in the Reference Document Database (RDD) of the cleaned rules for vehicle authorisation.

National technical rules represent technical barriers in the vehicle authorisation process because vehicles have to be compliant to these rules (usually in addition to the TSI basic parameters). Member States have to publish (notification to the European Commission) these national rules. Before they are notified, a "cleaning up" of rules is necessary. The remaining notified national technical rules may only cover Open Points in TSIs, Specific Cases in TSIs and issues of vehicle compatibility with the network (e.g. Class B signalling systems). The cleaning up process ensures, that only these relevant rules are published in RDD.

This indicator shows the progress of the above described process of "cleaning up" national technical rules. Once the process of cleaning up national rules is finalised, this indicator will focus on the progress in the reduction of the remaining notified national rules which will mainly depend on the progress of closing Open Points in TSIs and on the migration towards an interoperable infrastructure.

What is the desired target value?

All "cleaned up" national rules for vehicle authorisation are published in RDD.

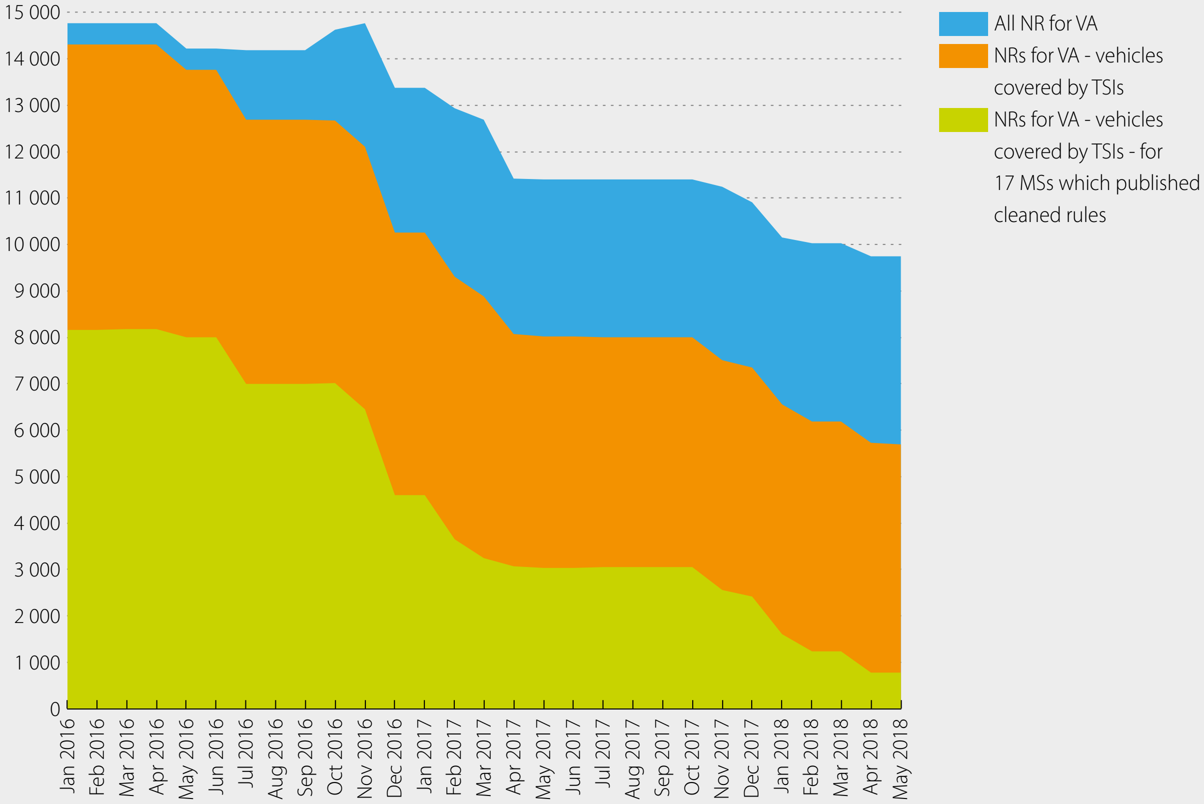
How reliable is the data?

Data is retrieved directly from the Agency's RDD after being input by the Member States. The reliability of the data depends on the extent to which there is up-to-date and complete data provision from the Member States.

What can we learn from the reported data?

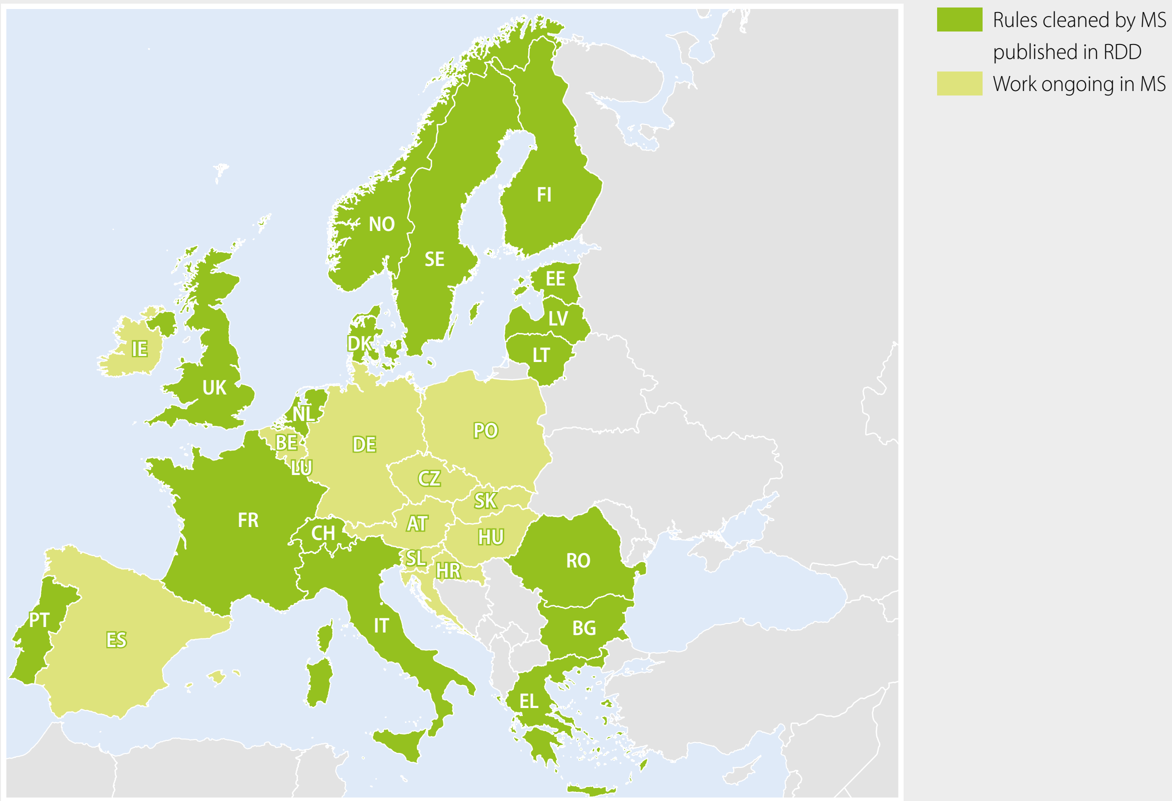
From Figures 33 and 34 we can observe substantial progress in the "cleaning up" of the national rules within the last reporting year. The total number of published RDD entries for national rules applicable for vehicles covered by TSIs dropped from about 14000 in January 2016 to 5700 in June 2018. Out of these, for the 17 Member States which published their rules after cleaning-up, the number is less than 800. Projected on all EU Member States, we estimate at short term around 1200 remaining national rules to be applied to vehicles on top of TSIs. A further reduction is expected after further cleaning up or during the next revisions of the TSIs.

Figure 33: National Rules for vehicle authorisation published in RDD, Jan 2016-May 2018



Source: RDD

Figure 34: Cleaning up of National Rules remaining on top of the TSIs for TSI compliant vehicles, state of play, June 2018



Source: RDD

RS 02 – Non-applications of vehicle-related TSIs

What does the indicator measure and why?

The indicator measures the number of derogation requests for the rolling stock related TSIs (LOC&PAS, WAG, NOI, CCS), as submitted by Member States. All requests for derogations received by the EC are counted, except those which were rejected.

What is the desired target value?

The lower the number of derogation requests, the higher the level of interoperability in Europe is.

How reliable is the data?

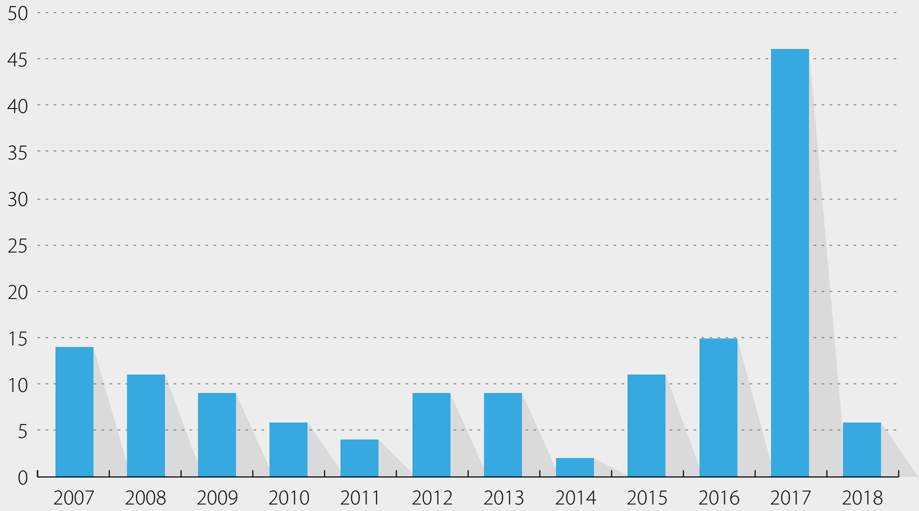
The data is directly retrieved from an internal database of the European Commission where all submitted derogation requests are recorded.

What can we learn from the reported data?

Except for the peak in 2017, the overall trend could be an indication of reasonably stable technical specifications, with an average of 10 derogations per year, assuming that the number of rolling-stock related projects per year did not decrease over the years. Year 2017 displays a peak in the number of derogations (Figure 35).

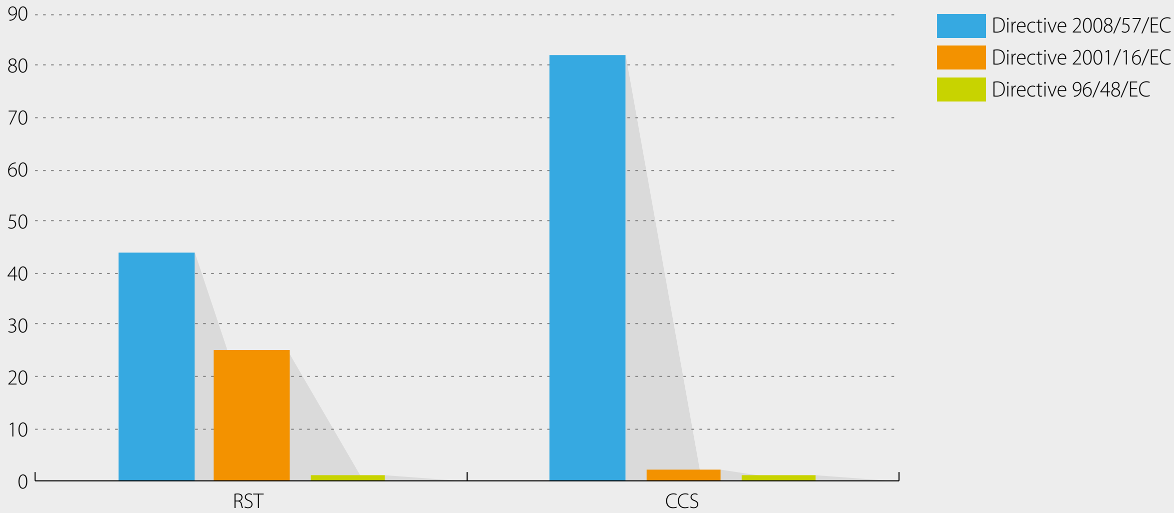
The TSI derogations concern most frequently the CCS, followed by RST (a category under which we accumulate for WAG, LOC&PAS and NOI) – Figure 36.

Figure 35: Derogations from rolling stock-related TSIs, SERA, 2007-2018



Source: EC internal database

Figure 36: Derogations from rolling stock-related TSIs by category and the reference Directive, SERA, 2007-2018



Source: EC internal database

RS 03 – Maturity of ETCS specifications

What does the indicator measure and why?

The indicator measures the evolution of the number of remaining errors in the European Rail Traffic Management System (ERTMS) specifications over time. This is needed to show the progress towards an interoperable and stable set of ERTMS specifications.

What is the desired target value?

The target value for the remaining errors in this indicator is zero for stability reasons.

How reliable is the data?

The data source is the Agency's ERTMS Change Control Management (CCM) Database. Data can be considered to be highly reliable.

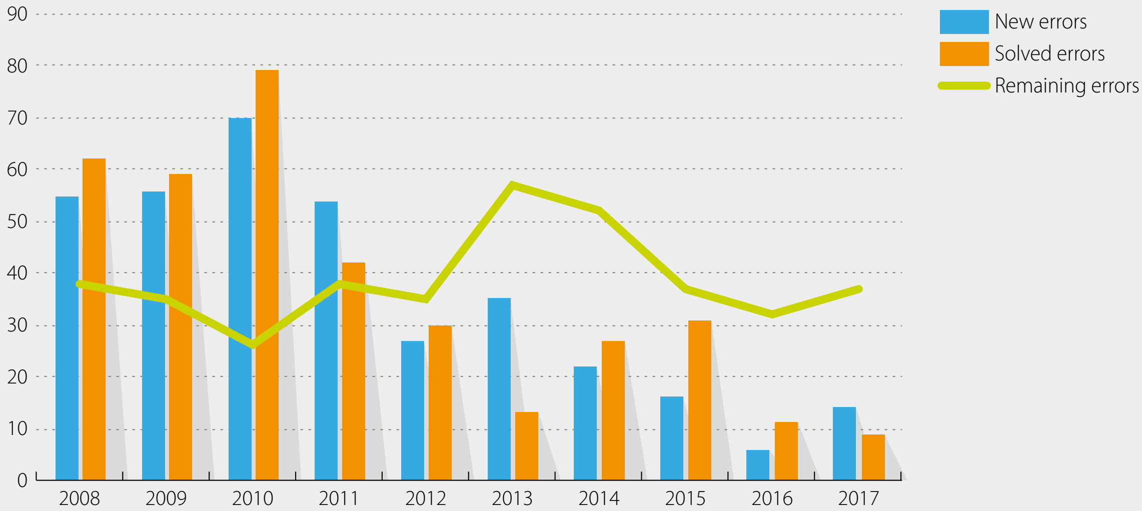
What can we learn from the reported data?

As displayed in Figure 37, the number of new (validated) errors detected within the period 2016-2017 is 20. The yearly number of new (validated) errors is decreasing since 2010.

The number of solved errors within the period 2016-2017 is 20. The number of solved errors in the period 2016-2017 is also lower than in previous periods due to the selection of non-compatible error corrections with high and/or medium criticality/workload. The remaining errors are classified in 4 categories (P1 - not compatible error with high criticality/workload; P2 - not compatible error with medium criticality/workload; P3 - compatible error with low criticality/workload; P4 - editorial error with no criticality/limited workload).

The next ERTMS legal release is not planned to be introduced before 2022 (introduction of specifications linked to the identified ERTMS game changers). This long period of stability (between 2022 and the current legal release B3R2 voted in 2016) should allow to further stabilise the set of specifications.

Figure 37: Evolution of ERTMS error change requests



Source: Agency's ERTMS Change Control Management (CCM) Database

RS 04 – Number of vehicles equipped with ETCS

What does the indicator measure and why?

This indicator shows the number of vehicles equipped with ETCS (and other Class B-signalling systems).

This deployment indicator monitors the ETCS deployment at vehicle side.

What is the desired target value?

The desired target value is ultimately 100%, while a sound progress is sought in a short and mid-term.

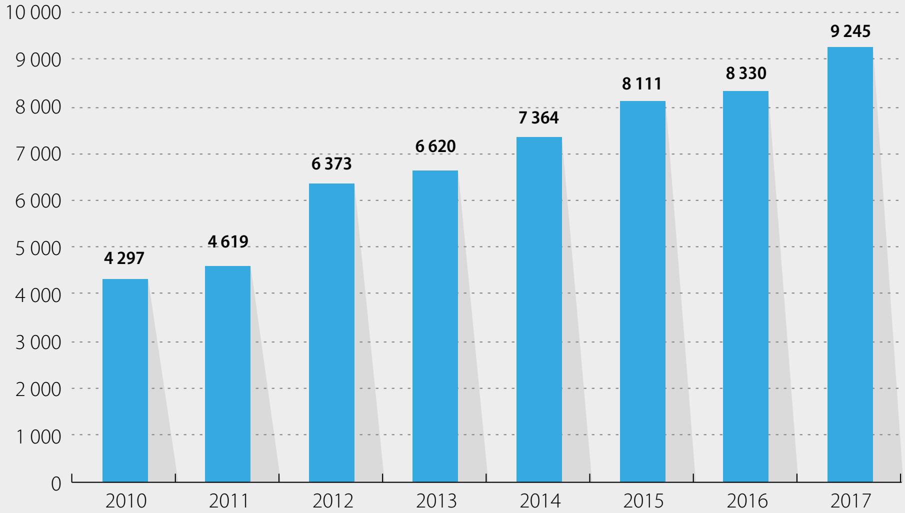
How reliable is the data?

The data on vehicles equipped with ETCS in Europe is extracted from the UNIFE Annual Reports. UNIFE relies on their members' network. The data were cross-checked with a sample dataset obtained from RUs (CER members).

What can we learn from the reported data?

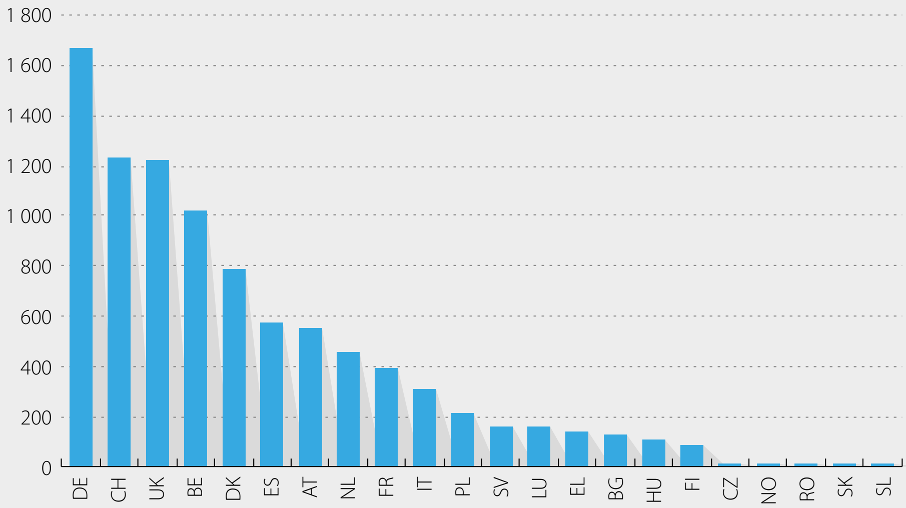
As displayed in Figure 38, the total number of already ETCS equipped vehicles in Europe is around 9.245 units. It has been increasing continuously, at an average annual rate of 12%. Considering the size of the railway network, Switzerland, Belgium, Denmark, Austria and the Netherlands are leaders in equipping their tractive vehicle fleet with ETCS (Figure 39).

Figure 38: Number of ETCS equipped vehicles (Level 1 and/or Level 2), SERA, 2010-2017



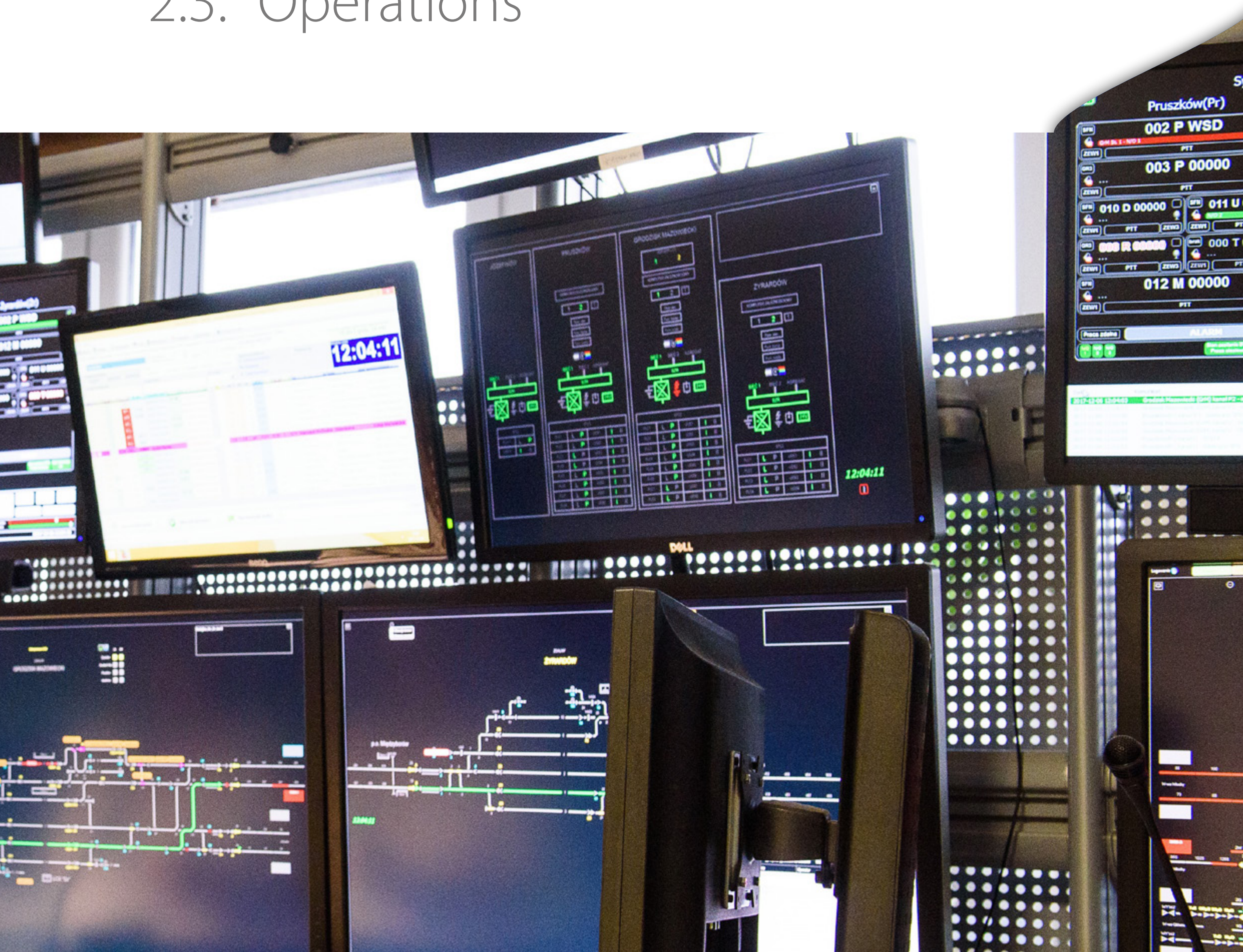
Source: UNIFE Annual Reports, sample checks with RUs

Figure 39: Number of contracted vehicles, ETCS equipped (Level 1 and/or Level 2), by country in SERA, end 2017



Source: UNIFE Annual Reports, sample checks with RUs

2.3. Operations



OP 01 – Train Drivers with a European License in accordance with the Train Drivers Directive

What does the indicator measure and why?

The indicator measures the proportion of train drivers in the EU Member States that hold a valid European license issued in accordance with the Train Drivers Directive (TDD) ([5]). With the available information, it is possible to calculate the proportion for individual Member States, as well as for the EU as a whole.

All train drivers in Europe must, by October 2018, hold a license in conformity with the TDD to facilitate cross-border train operations and labour mobility. This license is valid in all EU Member States. Monitoring this indicator would determine whether the implementation of this requirement in Member States is progressing in line with the target date and the extent to which there are significant national differences.

What is the desired target value?

According to the target set by the Train Drivers Directive there should be 100% conformity by October 2018.

How reliable is the data?

Statistics on the total number of train drivers and total number of train drivers licensed according to the TDD are provided by the NSAs in each Member State. The statistics are submitted to the Agency by the NSAs and hence their reliability and completeness depend on this input.

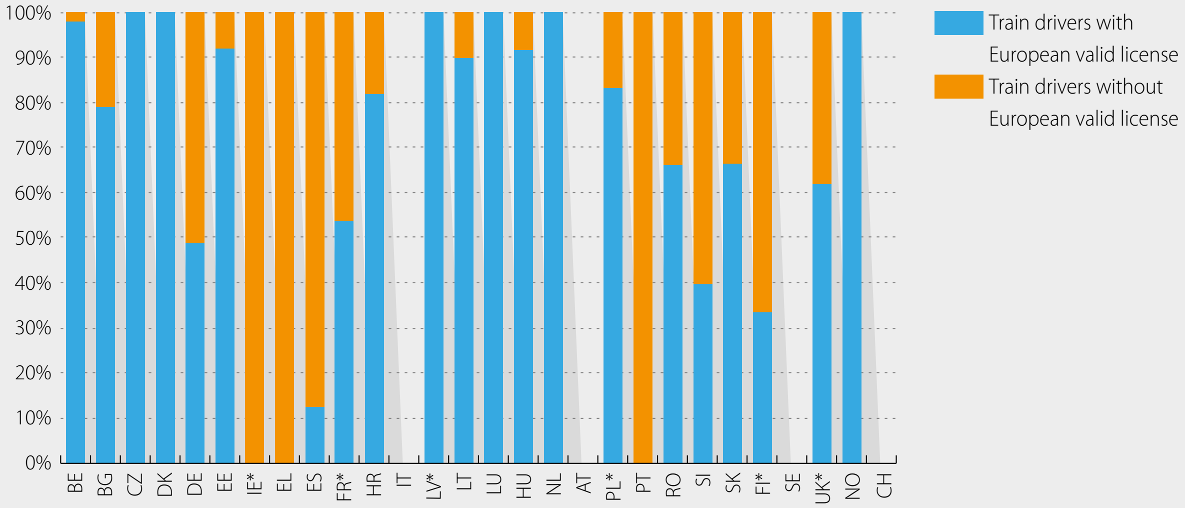
What can we learn from the reported data?

According to data reported via the NSA survey, seven countries had fully implemented, as of beginning of 2018, the Directive and have all drivers licensed with the EU driving license (Figure 40).

Figure 41 shows that for the EU as a whole, the proportion of train drivers holding a license in conformity with the TDD has increased over the period from 2014 to 2018 and has reached a level of about 72%. However, a higher rate would be expected giving the approaching legal deadline in October 2018. In practice, about one third of the national licenses will have to be "converted" into the EU model in a few months. This could be plausible as some countries have foreseen to "convert" all licenses in 2018 only.

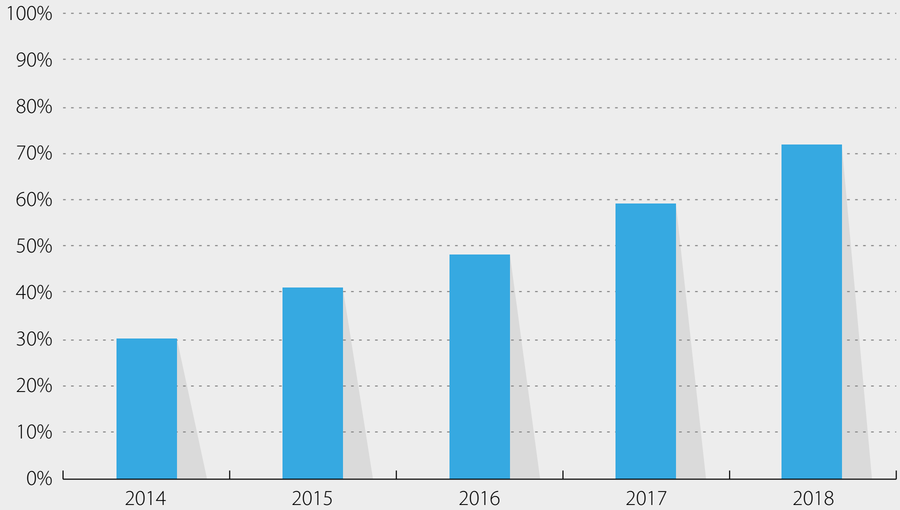
([5]) Directive 2007/59/EC of the European Parliament and of the Council of 23 October 2007 on the certification of train drivers operating locomotives and trains on the railway system in the Community

Figure 40: Train drivers with and without valid European license by country in SERA, by 1 January 2018 (*2017)



Source: NSA Survey

Figure 41: Proportion of train drivers with valid European train driver licenses by 1 January, SERA, 2014-2018



Source: NSA Survey

2.4. Databases and registers

DR 01 – Data completeness in Agency's registers and databases - RINF data completeness

What does the indicator measure and why?

The indicator of data completeness focuses on the infrastructure register as we assume that for the vehicle registers the degree of completeness is very high.

In particular, for NVRs this is assumed to be 100% since no vehicle can run if it is not registered in the NVRs, according to the Interoperability Directive. Data completeness is high also for the vehicle type data (ERATV), in accordance with the scope of application of the ERATV Decision.

When it comes to infrastructure data, the degree of completing RINF is progressing and we consider it relevant to display this progress until RINF is fully populated. This is done with 2 sub-indicators: Network completeness (defined as the length of lines inserted compared to the length of lines) and Parameter completeness (defined as the share of parameters for which data have been inserted compared to the total number of parameters).

The various registers and databases maintained by the Agency can only fulfil their intended purpose if they are well maintained and filled with relevant data. The completeness of data in the registers and databases is often a legal requirement. It is also a prerequisite for certain use cases (e.g. route compatibility check, statistical data use etc.).

What is the desired target value?

The desired target value for this indicator is to have 100% of required data stored in RINF. The RINF decision provides a calendar for the gradual implementation. The data relating to infrastructure covered by TSIs should have been inserted in the registers by March 2017, those relating to infrastructure not covered by TSIs should be inserted by March 2019 at the latest.

How reliable is the data?

Statistical indicators for data inserted in RINF are precise, reliable and up-to-date. Some minor questions may arise when it comes to the total length of lines as certain discrepancies could be noticed between the target length of lines determined in the national implementation plans and the values recorded in other sources. However, this should not affect significantly the value of the two completeness indicators.

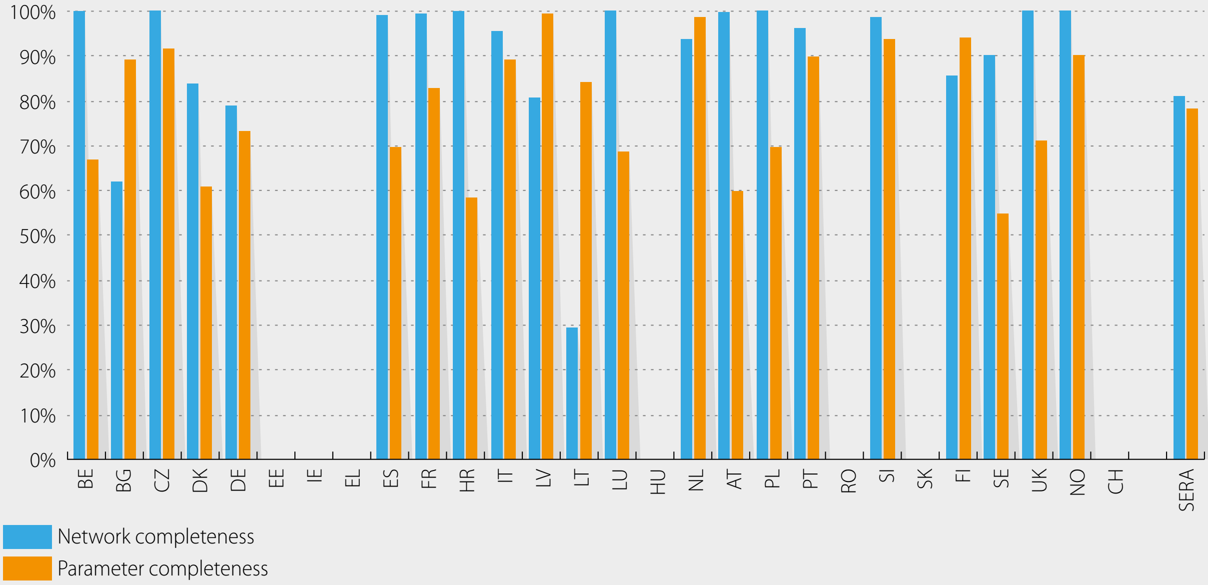
What can we learn from the reported data?

As of May 2018, 81% of the SERA railway network has been described in RINF (as section of lines), whereas 78% of parameters are available for the described sections (Figure 42).

In half of the countries, the total network is described, while in seven countries, there is no description at all.

The Agency draws attention on the fact that the absence of data for some networks and some lines hampers the usefulness of the RINF register and needs to be addressed with urgency.

Figure 42: Data completeness in RINF, May 2018



Source: RINF

DR 02 – Proportion of TAF TSI functions implemented compared to the Master Plan

What does the indicator measure and why?

The indicator measures the progress in the deployment of TAF TSI. The baseline is the TAF TSI Master Plan, which includes commitments about the deadlines for implementing the various functions (RU specific, RU/IM functions, Wagon Keepers and Service Providers related functions).

Considering that the revised TAF TSI is now in force, it is relevant to monitor the degree of its deployment. The monitoring is performed at function level in order to be able to highlight the gradual steps taken towards ensuring full TAF TSI compliance.

What is the desired target value?

The desired target value for this indicator is to have 100% of the individual functions implemented according to their individual implementation dates as communicated in the Master Plan.

How reliable is the data?

A specific Implementation Cooperation Group led by the Agency and involving the sector and the National Contact Points was set up for the purpose of collecting data on the TAF TSI implementation. The TAF TSI Implementation Cooperation Group deploys a dedicated tool which allows the RUs and IMs to report twice a year on the degree of implementation of specific TAF TSI functions. Data provided by the RUs and IMs has a good degree of reliability. While analysing the trends in the deployment of the functions, attention should be paid to the fact that the population of respondents may not be the identical across various reporting periods.

What can we learn from the reported data?

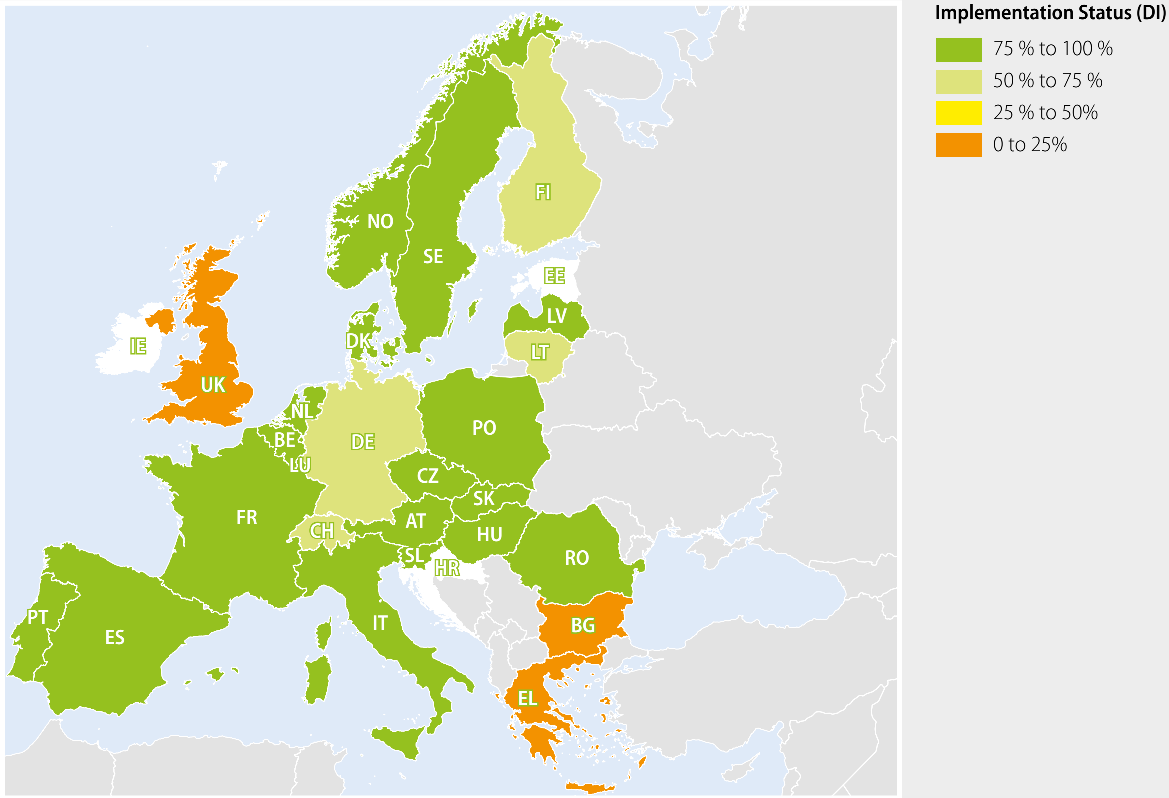
In the period 2014-2018 seven reports on the implementation of TAF TSI functions have been issued ([6]). As an example, based on the data provided in the reporting tool at the end of 2017, the average degree of implementation of the Train Running Information function was above 77% for the IMs (Figure 43), while for the reporting RUs, it was slightly above 49% (Figure 44).

The level of the implementation rate for the IMs, combined with their high potential to drive the TAF TSI implementation process creates good perspectives for the catching up on the side of RUs in the future. The deployment of this function at European rail freight corridor level is good for most of the corridors and corridors sections.

An analysis of the usability, as well as an ex post evaluation of the impacts from the various TAF functions can be conducted as soon as the implementation process is finalised.

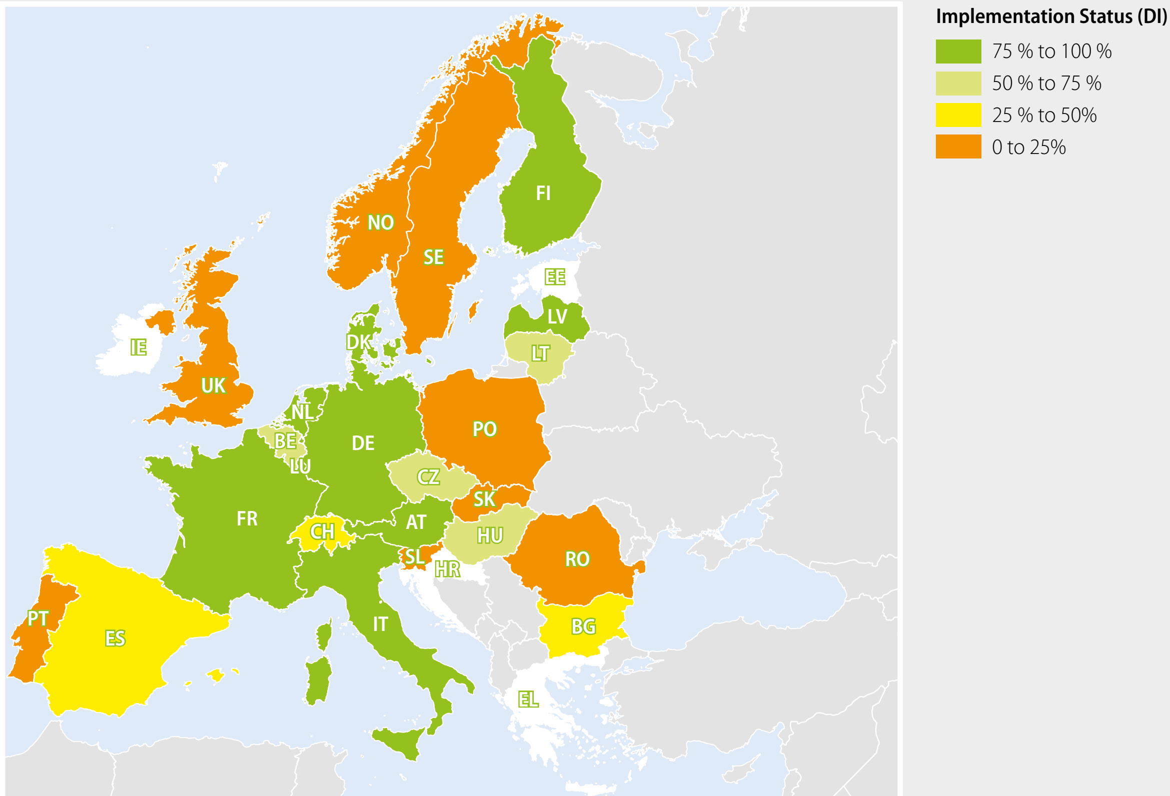
([6]) http://www.era.europa.eu/Document-Register/Pages/Implementation.aspx

Figure 43: Proportion of TAF TSI functions implemented compared to the Master Plan for Train Running Information by IMs, Q2 2017



Source: TAF Implementation Report

Figure 44: Proportion of TAF TSI functions implemented compared to the Master Plan for Train Running Information by RUs, Q2 2017



Source: TAF Implementation Report

3. Regulatory outcomes and impacts

ROI 01 – Number of valid safety certificates published in ERADIS

What does the indicator measure and why?

The indicator measures the total number of valid safety certificates published in ERADIS database with a validity period beyond May 2018, per Member State. The safety certificate comprises a valid Part A safety certificate (certification confirming acceptance of the railway's undertaking safety management system) and at least one Part B safety certificate (certification confirming acceptance of the provisions adopted by the railway undertaking to meet specific requirements necessary for the safe supply of its services on the relevant network).

This reflects the current provisions for safety certification until the current Safety Directive will have been transposed, providing for Single Safety Certificates (valid across Europe). The following issue of the report will reflect this change.

What is the desired target value?

There is not a desired target value on the number of valid Part A safety certificates or valid Part B safety certificates in each Member State. However, it is expected that the total number of valid Part B safety certificates in each Member State would be equal or higher than the total number of valid Part A safety certificates in the respective Member State. The opposite situation would denote low quality data entry in ERADIS for the respective Member State.

Low quality data in ERADIS is likely to have negative impacts under the new certification regime as provided for in the 4th Railway Package, in particular, additional burden and costs for the railway undertakings applying for single safety certificates as of June 2019 in order to clarify the data mismatches. In addition, in accordance with Article 3 of the new Implementing Regulation establishing practical arrangements for issuing single safety certificates, the Agency shall monitor the expiry dates of the safety certificates (for cross-border operations). This tasks entrusted to the Agency can only be carried out by means of accurate data in ERADIS, which can allow the Agency to better plan the resource needs for such tasks.

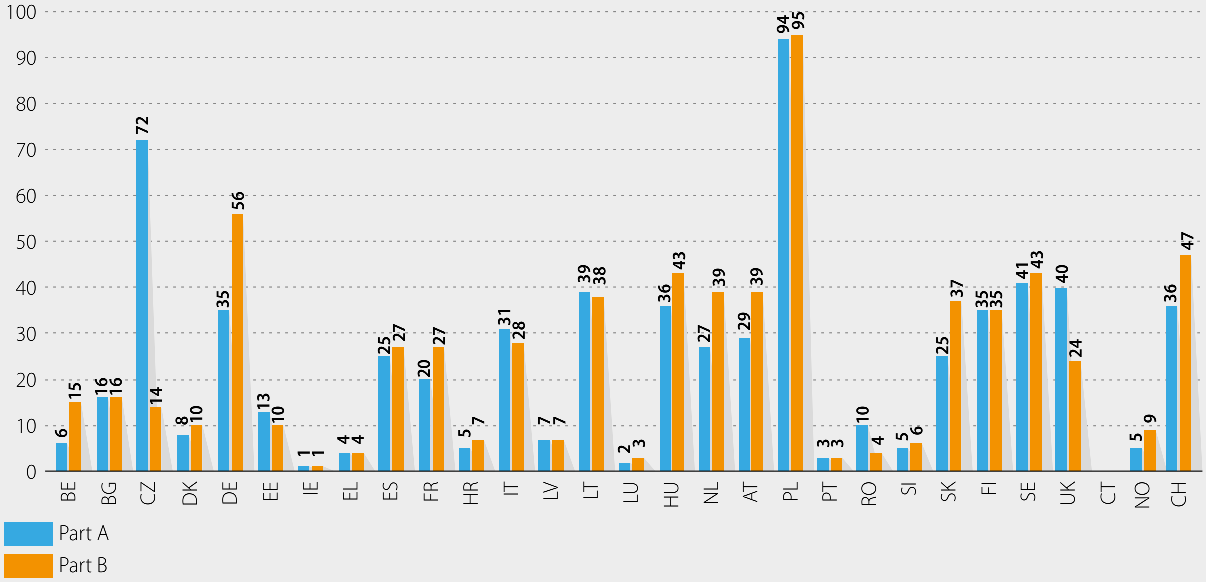
How reliable is the data?

NSAs need to notify their decision on issuing a part A or a part B Safety Certificate to the Agency within one month of issuing the corresponding safety certificate. The Agency validates and publishes them in the ERADIS database. ERADIS data quality and completeness depend on the quality of the data input from the NSAs.

What can we learn from the reported data?

Data presented in Figure 45 shows data inconsistencies in six countries: Czech Republic, UK, Romania, Lithuania, Italy and Estonia. Further analysis is being carried out at the moment together with the Member States in order to achieve improvements in the data quality in ERADIS.

Figure 45: Total number of valid Part A and Part B safety certificates published in ERADIS, May 2018



Source: ERADIS database

ROI 02 – Railway safety performance trend in SERA

What does the indicator measure and why?

The starting point for this indicator is to calculate for each Member State the ratio of Fatalities and Weighted Serious Injuries (FWSI) per number of train-km. Measuring the EU average and the extent of variation over time will determine whether there is overall improvement resulting in lower EU fatality and serious injury rates and whether there is convergence between EU Member States.

A drive towards the convergence of railway safety performance between Member States is a core dimension in the context of establishing the SERA.

What is the desired target value?

Making Europe the world leader in railway safety is a key Agency objective. The Agency believes that the number of fatalities has still to be reduced. It is worth to underline here that the Railway Safety Directive mentions that the safety level should be maintained and where reasonably practicable, improved. Furthermore, there are implicit requirements for the reduction in variation in safety performance between the EU Member States.

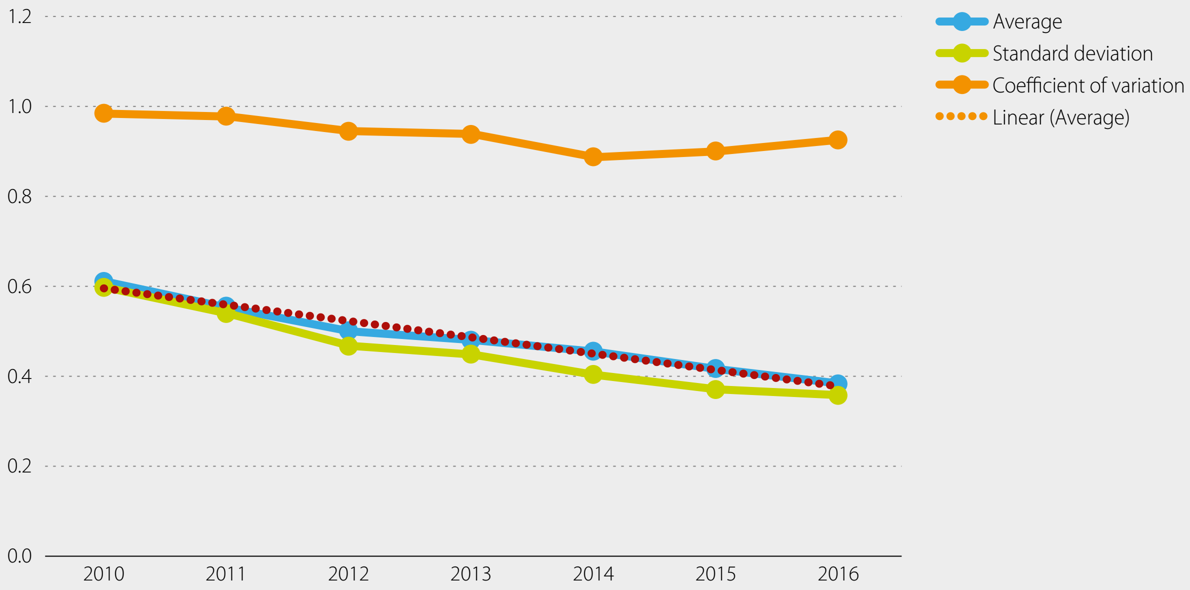
How reliable is the data?

Data is supplied by the NSAs and stored in ERAIL. Its quality and completeness thus depend on the quality of inputs by NSAs with verification by the Agency. Statistics on the total number of fatalities have a high level of reliability, while the statistics on seriously injured persons may be less comparable between Member States.

What can we learn from the reported data?

The variation in FWSI rate between Member States (measured through the standard deviation) has decreased over the period 2010-2016 at the same pace as the average FWSI rate of Member States, since the coefficient of variation has been stable over the same period (Figure 46). This means that the levels of safety of MSs have been converging at the same speed as they were decreasing over time. However, the speed of convergence has slowed down considerably in the most recent years from 2014 to 2016.

Figure 46: FWSI per million train-km (average, standard deviation and coefficient of variation for SERA countries), 3 years moving average within the period 2010-2016



Source: ERAIL

ROI 03 – Worldwide railway safety

What does the indicator measure and why?

The indicator measures the overall railway fatality risk, as well as the passenger fatalities in EU-28, Australia, Canada, Japan and USA. To better understand the data, a five years period of data (2012-2016) has been used. There are fluctuations between individual years and this approach provides the basis for measuring the progression of the different railway safety approaches adopted in Europe and in these countries.

According to the Railway Safety Directive, railway safety should be maintained and, where reasonably practicable, improved. However, it should be an aspiration of the entire railway sector to strive towards excellence in railway safety. In the strategic vision of the Agency, the SERA should become the world leader in railway safety. This indicator is meant to provide for the monitoring on the progress towards such leadership.

What is the desired target value?

In this benchmarking comparison, it is desirable that the value of the fatality risk for SERA be lower than the value for comparable railway systems worldwide.

How reliable is the data?

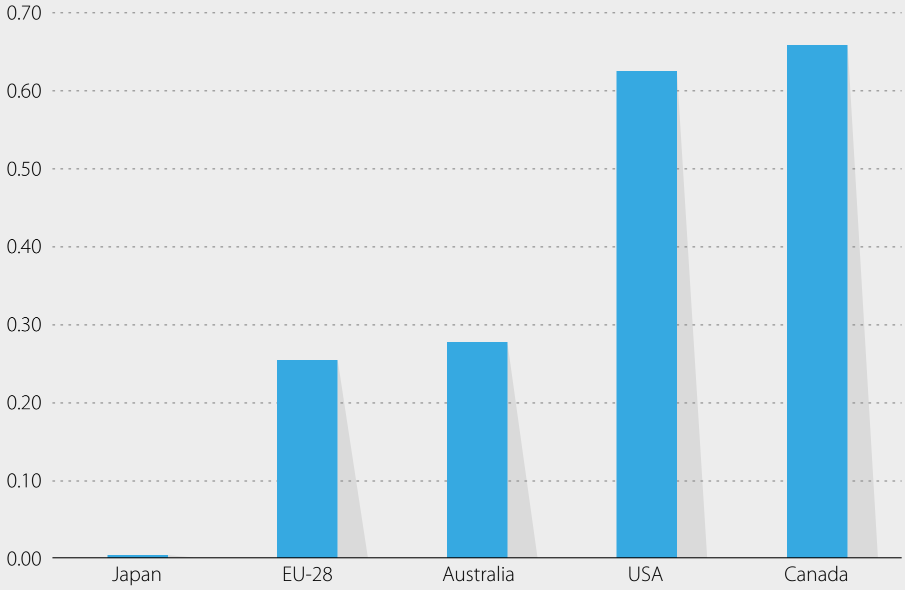
Data is taken from statutory reports produced by the national railway safety or safety administrations of the concerned jurisdictions. There is no guarantee that all the countries use the same, internationally agreed, definition of a railway fatality which occurs "…within 30 days of accident" and that the train-km are recorded in the same fashion for all licensed railway undertakings operating in the same jurisdictions. Moreover, the quality of data on trespasser fatalities (so as to exclude suicide fatalities) is also likely to be an issue. Nevertheless, the comparability of data may be satisfactory for the given purpose of an international benchmark.

What can we learn from the reported data?

The rail fatality risk of SERA (Figure 47) is the second lowest across the countries compared. The gap in risk between the EU and the first ranked (Japan) is however rather high and it may be challenging to close it within a mid-term period.

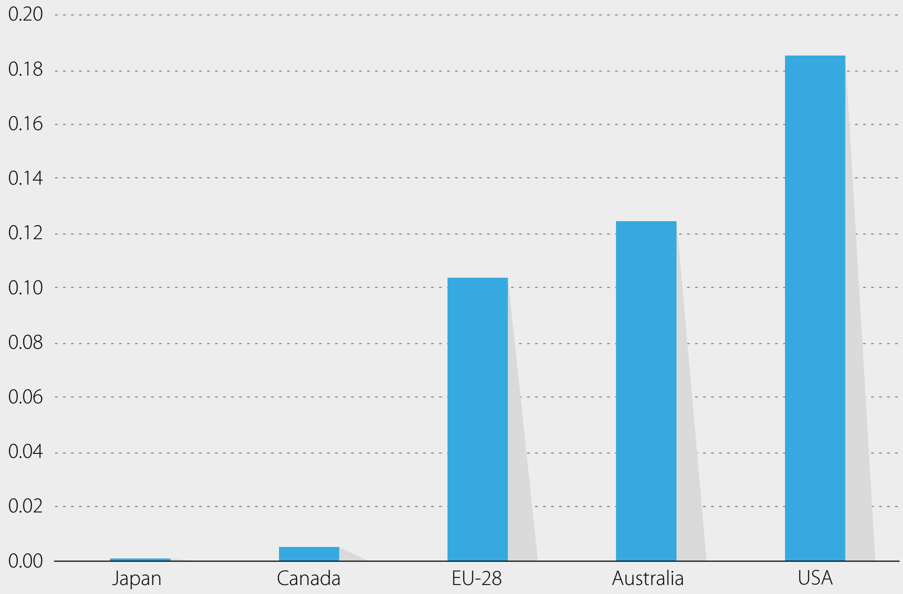
In terms of passenger fatality risk of SERA (Figure 48), EU 28 ranks third in the comparison with Australia, Canada, Japan and USA. The reduction of the passenger fatality risk across the EU 28 railways should be a matter of strong interest and action at European level.

Figure 47: Railway fatality risk (fatalities per million train-km) compared across a selection of countries worldwide, 2012-2016



Source: ERAIL, statutory reports produced by national administrations of concerned jurisdictions

Figure 48: Passenger fatality risk (passenger fatalities per billion passenger train-km) compared across a selection of countries worldwide, 2012-2016



Source: ERAIL, statutory reports produced by national administrations of concerned jurisdictions

ROI 04 – Railway safety compared to other transport modes in SERA

What does the indicator measure and why?

The indicator measures the risk of fatality for a passenger travelling over a given distance using different transport modes. The indicator looks at five-year blocks of data (2011-2015 and 2010-2014, respectively).

Although the use and nature of transport modes differ widely, a direct comparison of safety is possible using certain travel scenario hypotheses.

What is the desired target value?

There is no applicable target value but it is expected that the railway transport mode will at least maintain its relative safety level as compared to the other modes.

How reliable is the data?

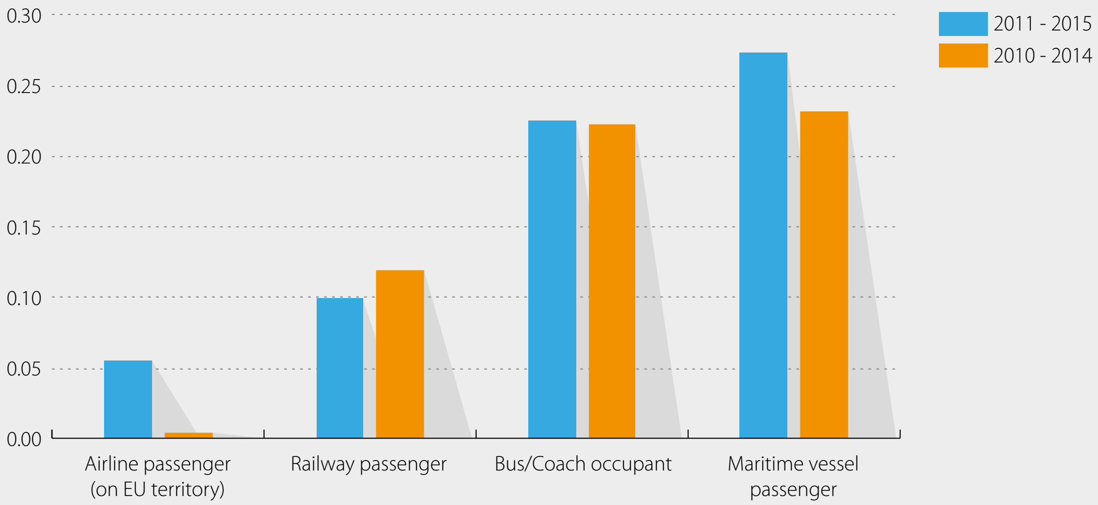
One should note here that the risk estimated for commercial air travel, but also for bus and train travel, is subject to wider variations, as one single accident may result in dozens of fatalities. Since the annual number of aircraft, train and coach fatal accidents is relatively small, the risk estimated for a relatively short period, in this case, for five years, should be read with caution. Last, but not least, the results of such comparative exercise also strongly depend on the type of exposure data considered (e.g. number of journeys or time spent by passengers).

What can we learn from the reported data?

The fatality risk for a train passenger is one third lower compared to the risk for a bus/coach passenger, but at least twice as high as that for commercial aircraft passenger. Travelling on board of a sea ship carries the highest passenger fatality risk among all transport systems (Figure 49).

The use of individual transport means, such as passenger car or motorcycle carries substantially higher fatality risk: car occupants have at least 20 times higher likelihood of dying compared to train passenger travelling over the same distance. The fatality risk for an average train passenger is now just under 0.10 fatalities per billion passenger kilometres, making it comparatively the safest mode of land transport in the EU (Figure 50).

Figure 49: Passenger fatality risk (passenger fatalities per billion passenger-km) for different modes of transport, EU, 2010-2014 and 2011-2015



Source: CARE database, Eurostat, ERA, EASA, EMSA annual reports

Figure 50: Passenger fatality risk (passenger fatalities per billion passenger-km) for different modes of land transport and type of user, EU, 2011-2015

User	Fatalities per billion passenger-km (2011-2015)	Fatalities per billion passenger-km (2010-2014)
Railway passenger	0.100	0.119
Bus/Coach occupant	0.225	0.222
Car occupant	2.670	2.820
Car driver	1.820	n/a
Car passenger	0.850	n/a
Powered two-wheelers	37.800	39.950

Source: CARE database, Eurostat, ERA, EASA, EMSA annual reports

ROI 05 – Railway accident costs

What does the indicator measure and why?

According to the Railway Safety Directive, the economic impact of accidents is measured by the economic impact of fatalities and serious injuries, costs of delays, costs of material damage to rolling stock or infrastructure and costs to the environment.

A common methodology for deriving those is described in Annex I to the Railway Safety Directive. While the economic impact of casualties can be estimated for all countries, the costs of delays are only available for 22 SERA countries.

Unsafety of the railway system has direct and indirect impacts on society. Economic theory allows to express those impacts in monetary terms. This then gives an idea of the costs of unsafety of railway operation to both industry and to the society.

What is the desired target value?

The desired value is close to zero, being strongly dependent on the desired target for significant railway accidents.

How reliable is the data?

Data is reported by NSAs for more than ten years, under Annex I to the Railway Safety Directive (CSIs), whereas detailed guidance material, which also contains fall back values, is available. At the same time, some countries fail to report some types of costs, so the reliability should be considered on a case by case basis.

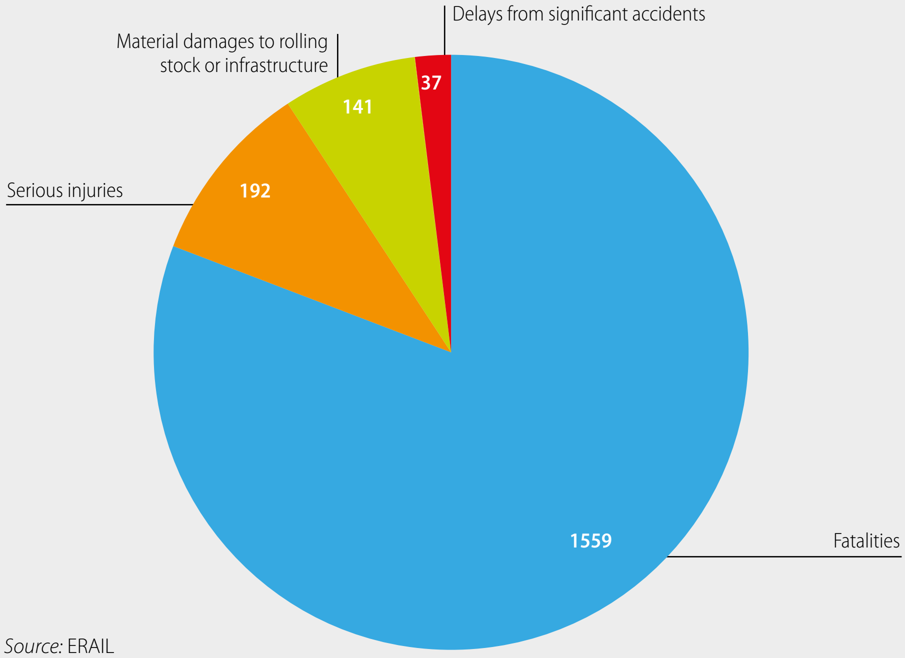
What can we learn from the reported data?

Total reported costs of significant accidents in SERA amounted to almost 2 billion EUR in 2016 (Figure 51). However the actual costs are likely to be higher as not all countries provide data for all types of costs. Casualties account for 90% of those costs.

Figure 52 shows a significantly variable distribution as well as a variable break down of these costs among the SERA countries.

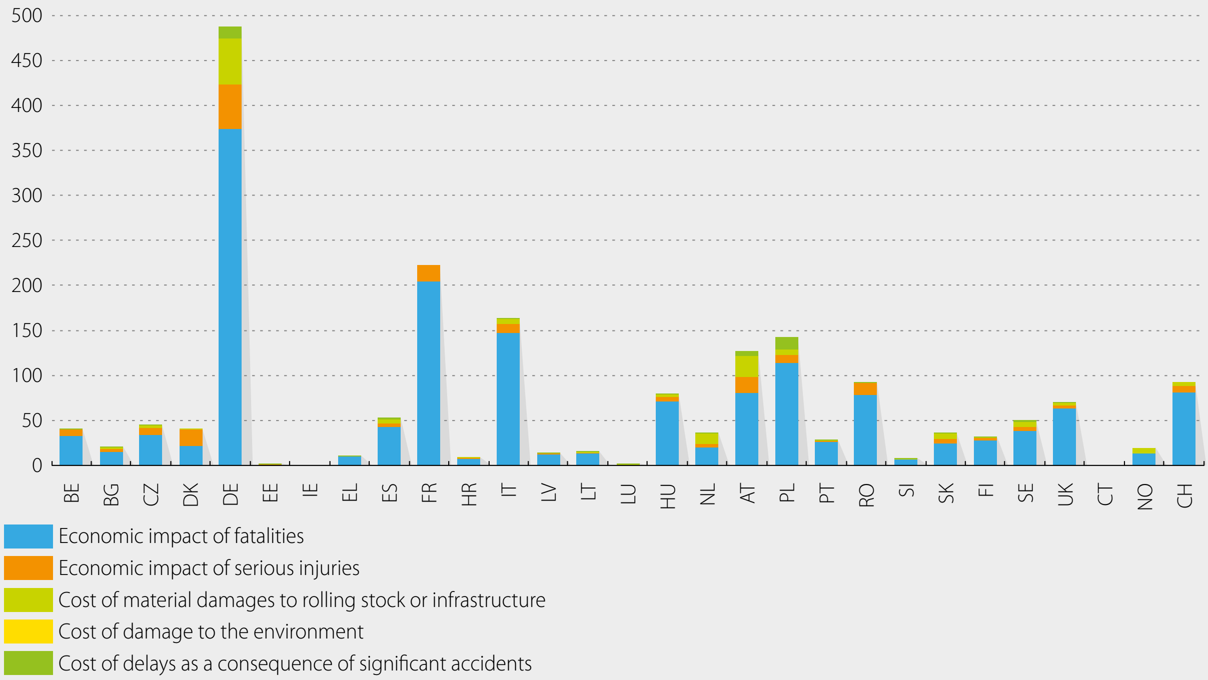
This shows another facet of how important the improvement of railway safety performance is in SERA.

Figure 51: Economic impact of significant accidents, SERA, million EUR, 2016



Source: ERAIL

Figure 52: Economic impact of significant accidents, by country in SERA, million EUR, 2016



Source: ERAIL

ROI 06 – Vehicles authorised under the Interoperability Directive (first and additional authorisations)

What does the indicator measure and why?

This indicator measures the total number of authorised vehicles distinguishing between first and additional authorisations covering the following vehicle types: wagons, locomotives, coaches, fixed or pre-defined formation and special vehicles. The indicator is useful by showing how the volume of authorisations is split between first and additional ones. This can contribute to determine the possible implications of the Fourth Railway Package provisions regarding the authorisations for placing on the market. It is foreseen that from 2019 the indicator will be amended to display information regarding the split between authorisations granted by NSAs and authorisations granted by the Agency.

In the future, once sufficient return of experience will be available from the implementation of the Fourth Railway Package, this indicator will be complemented with an indicator on time and costs for vehicle authorisation.

What is the desired target value?

There would not be a specific desired target value in terms of number of authorisations (first or additional) as this would be linked to or influenced by a number of different aspects including macroeconomic conditions.

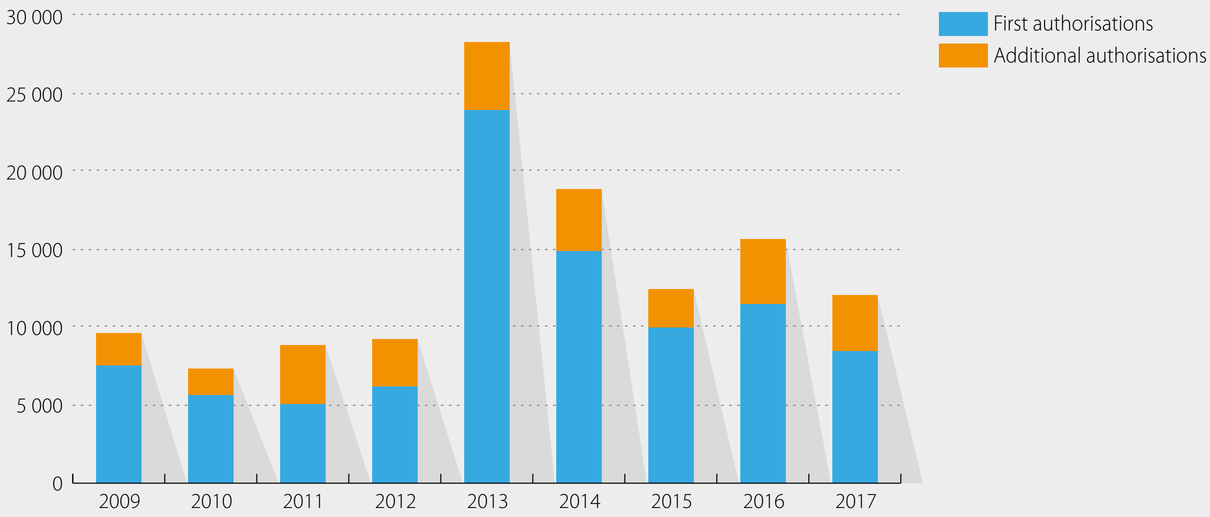
How reliable is the data?

Data is based on the survey that ERA addressed to the NSAs. The quality and completeness thus depend on the quality of inputs by NSAs.

What can we learn from the reported data?

The reported data suggests that the number of additional authorisations is relative low compared to the number of first authorisations (Figure 53). Moreover, there is significant fluctuation in the total number of authorisations being influenced by short-term economic conditions, as well as other factors. In particular, the significantly high number of first authorisations in 2013 appears to be an outlier and is according to the available information largely linked to the authorisation approach for wagons in one Member State only.

Figure 53: Vehicles authorised under the Interoperability Directive (first and additional authorisations), 2009-2017



Source: NSA Survey

ROI 07 – ETCS trackside costs

What does the indicator measure and why?

The indicator measures the investment costs for ETCS trackside deployment (not including additional costs for the interlocking part or radio communication part). The ETCS trackside deployment costs are measured for ETCS L1 and ETCS L2 projects.

The indicator reflects the effect of an open market for ETCS with multiple suppliers on the costs of ETCS trackside deployment and its evolution over time.

What is the desired target value?

The intermediate target value for the ETCS trackside cost for Infrastructure Managers is below 100 KEUR/equipped double-track line km (not including additional costs for the interlocking or radio communication parts).

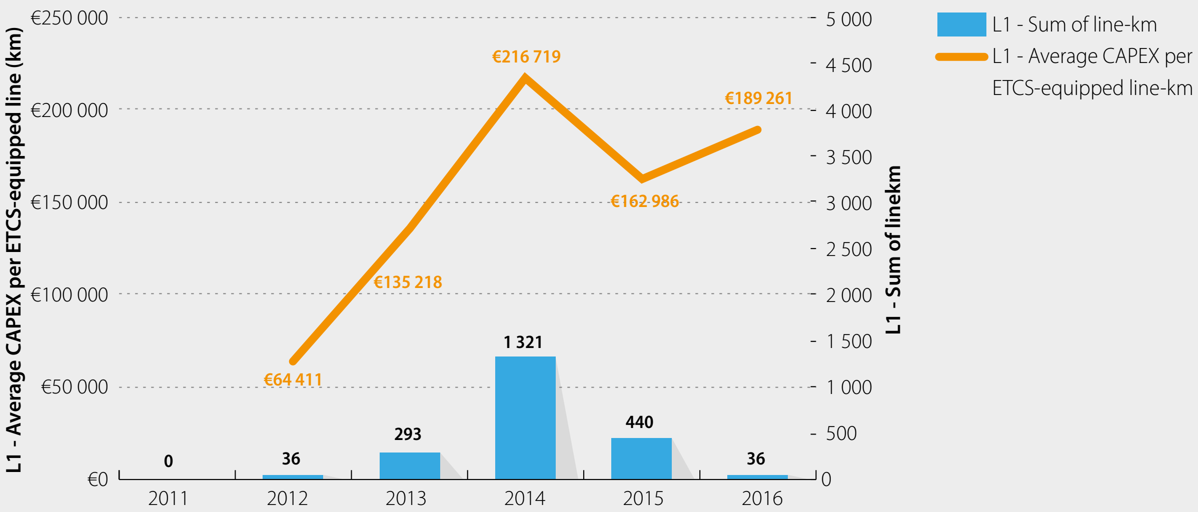
How reliable is the data?

The current data for the ETCS trackside costs is based on application files of ERTMS funded projects supported by the Innovation and Networks Executive Agency (INEA). The quality of the data is estimated to be highly reliable.

What can we learn from the reported data?

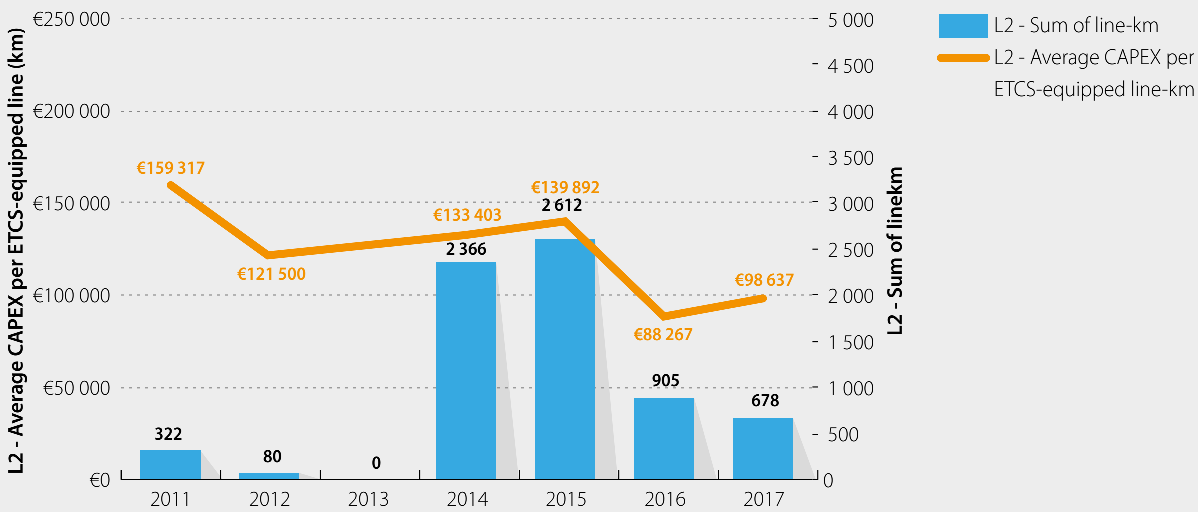
The reported data for the ETCS trackside costs demonstrates the downward cost trend for ETCS L2 deployment compared to an upward cost trend for ETCS L1 deployment (Figures 54 and 55). The reported data also demonstrates an increasing number of ETCS L2 applications compared to ETCS L1 applications.

Figure 54: Average CAPEX per ETCS Level 1 equipped line-km, 2011-2016



Source: INEA data

Figure 55: Average CAPEX per ETCS Level 2 equipped line-km, 2011-2017



Source: INEA data

ROI 08 – ETCS on-board costs

What does the indicator measure and why?

The indicator measures the investment costs for ETCS on-board deployment. The on-board costs exclude prototyping (first in class) and focus only on the serial retrofitting costs. The costs in EUR per on-board unit (OBU), equal to vehicle, is used.

The indicator reflects the effect of an open market for ETCS with multiple suppliers on the costs of on-board deployment and its evolution over time.

What is the desired target value?

The intermediate target value for the ETCS single on-board cost for RUs is 85 [kEUR/OBU]. Given the ongoing development of the market for ETCS OBU, a decreasing trend in costs is expected.

How reliable is the data?

The current data for the ETCS on-board costs is based on application files of ERTMS funded projects supported by the Innovation and Networks Executive Agency (INEA). The quality of the data is estimated to be reliable taking into account the following:

- the maximum eligible costs of the OBU has been capped within ERTMS dedicated calls with a ceiling of €150,000 (TEN-T) and €250,000 per OBU;
- there was no homogeneous approach to eligibility of a prototype costs. Within certain calls they were accepted in full, provided justified, and in other they were capped by the OBU ceiling.

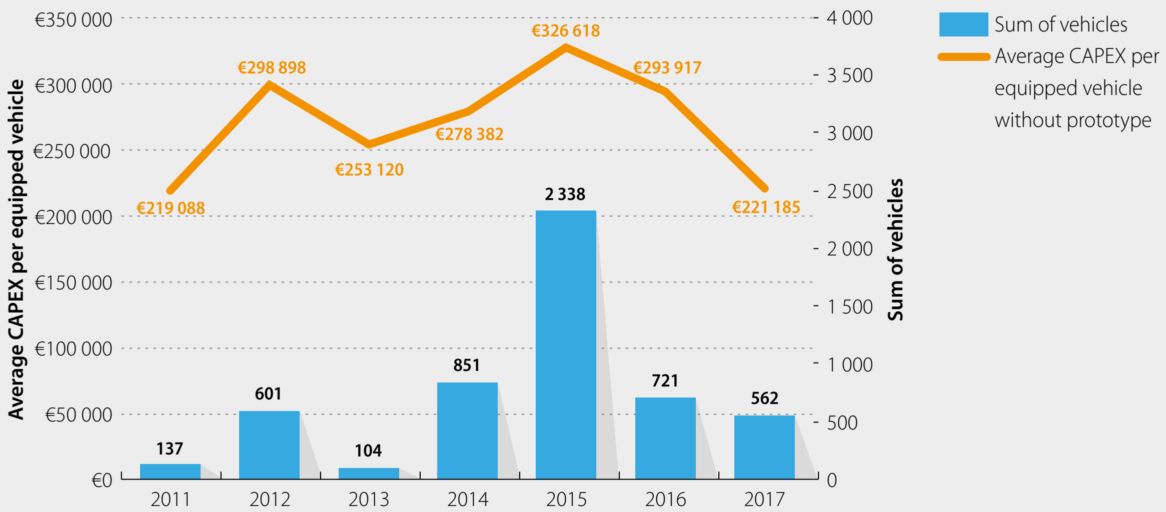
The above elements impact on the outcome of the OB costs analysis.

What can we learn from the reported data?

The reported data for the ETCS on-board serial retrofitting costs demonstrates a stable trend for ETCS on-board deployment (Figure 56) with an average cost of approximately 250 [kEUR/OBU], which is above the intermediate target value of 85 [kEUR/OBU].

Specific actions such as those linked to the Fourth Railway Package (single authorisation) are expected to reduce the fixed costs of multiple authorisations. The stability of the ETCS specifications (Baseline 3 Release 2 voted in February 2016) for a long period should contribute in the next years to a downward trend in ETCS on-board costs. The future deployment of "ETCS only" vehicles compared to vehicles with ETCS and other Class-B systems simultaneously on-board are also expected to reduce the costs for ETCS on-board products.

Figure 56: CAPEX per ETCS equipped vehicle (without prototype), 2011-2017



Source: INEA data

ROI 09 – ERTMS supply market in the EU

What does the indicator measure and why?

The indicator measures the number of suppliers of ERTMS equipment (incl. constituents) in the EU. We have looked more in-depth at two key constituents, namely ETCS onboard and the Radio Block Centre (RBC) ([7]).

The number of ERTMS suppliers is an indicator of the openness of the ERTMS supply market. A relatively limited number of market participants may lead to a non-competitive market situation with relatively high unit costs and thereby indirectly affecting the progress of deployment.

What is the desired target value?

There is no target value defined, but a small or a decreasing number of suppliers would signal a lower competition and thus potential higher prices.

How reliable is the data?

Reliability of the data is considered to be high. The figures are based on data collection contract commissioned by ERA, which was cross-checked for completeness with UNIFE.

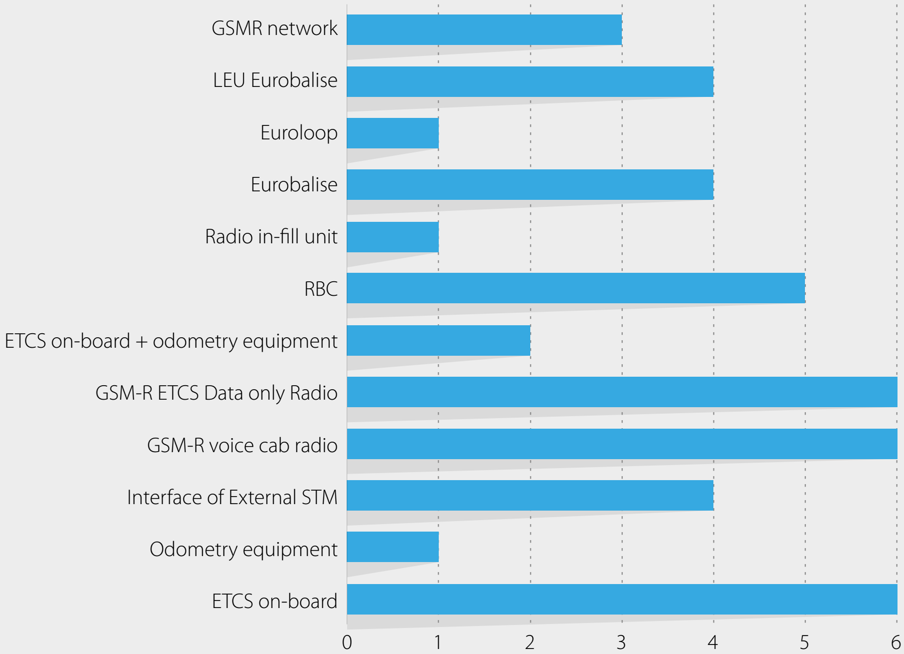
It has to be taken into account that ERTMS suppliers could purchase the ERTMS products from external manufacturers and may not necessarily be manufacturing the products themselves. This is in particular the case for GSM-R products for which it is assumed that 2 or 3 manufacturers are producing the GSM-R on-board and trackside equipment. Therefore, the underlying number of manufacturers could in reality be lower than the indicated data.

What can we learn from the reported data?

Figure 57 shows that the ERTMS market is more open compared to the Class B signalling market (for which in practice one or two suppliers are delivering products). It is noted that there is only one manufacturer for odometry equipment and radio in-fill unit.

([7]) The RBC is a device used at ETCS Level 2 acting as a centralised safety unit which, using radio connection via GSM-R, receives train position information and sends movement authorisation and further information required by the train for its movement. The RBC interacts with the interlocking to obtain signalling-related information, route status, etc. It is also able to manage the transmission of selected trackside data and communicate with adjacent RBCs.

Figure 57: ERTMS constituents supply market in Europe (No. of suppliers), 2018



Source: Data collection commissioned by ERA, cross-checked with UNIFE

ROI 10 – Fulfilment of use cases by registers, databases, telematics TSIs

What does the indicator measure and why?

This indicator measures the proportion of registers' use cases which are reported as fulfilled by their respective users.

For the time being, the scope of the indicator includes the railway vehicle and infrastructure registers and is based on surveying the relevant stakeholders in relation to the respective registers. The survey question addressed was: "Do the following use cases fulfil their purpose for you? (Select "not relevant" when not relevant for you.)?"

For the future this will gradually include all the registers, databases from the Agency's scope of work, as well as the telematics TSIs.

This is meant to indicate to the Agency if the actual usefulness of the railway registers in the activities of the relevant stakeholders is in line with what is expected from the respective registers. It can help identifying if there are use cases which are not properly fulfilled in view of further analysis and decision making.

What is the desired target value?

The desired target value of this indicator is to have 100% use cases reported as fulfilled for each register, database and the telematics TSI, respectively.

How reliable is the data?

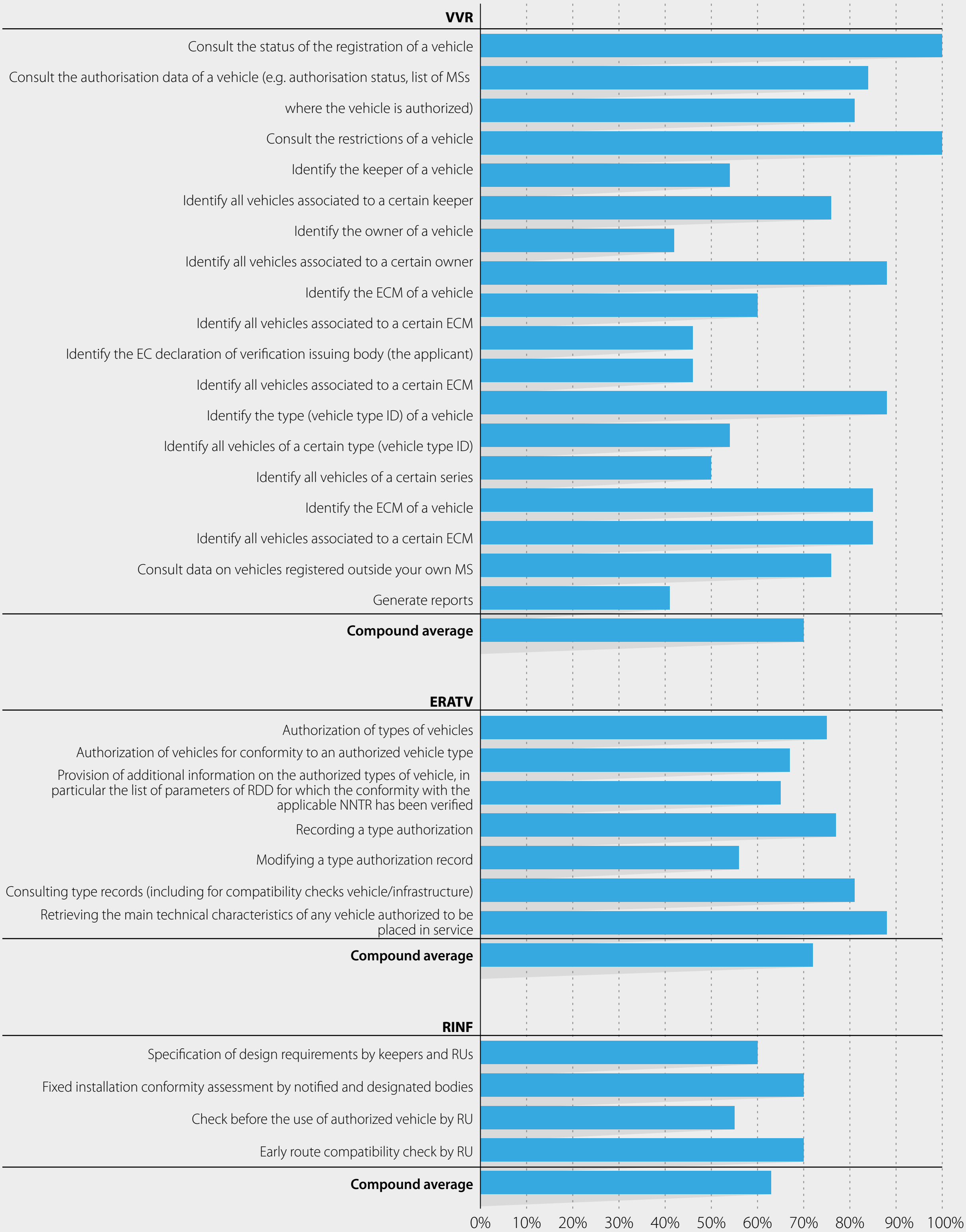
The indicator was implemented by means of an online survey embedded in the registers' IT tools for ECVVR and ERATV and through a regular working party survey for RINF.

Reliability of the collected data depends on the respondent sample size in relation to the number of unique users. The surveys have been carried out from February to May 2018, with over 20 responses collected for each register and with more than 15 respondents for which the given purpose was relevant. Given the number of unique users, this is a rather small sample and the values should be interpreted with caution.

What can we learn from the reported data?

Among 30 unique use cases, only for two the respondents believed that their purpose is not fulfilled, while for two others, all respondents believed that their purpose was fulfilled. The positive perception regarding the use case fulfilment rate is highest for ERATV, followed by VVR and RINF register (Figure 58).

Figure 58: Proportion of use cases reported as fulfilled for ECVVR, ERATV and RINF, ERA survey 2018



Source: ERA surveys

ROI 11 – Usability of the Agency's IT tools for registers and databases

What does the indicator measure and why?

The indicator measures the easiness-of-use (usability) of the Agency's registers' IT tools and is based on surveys addressed to the relevant categories of users. It looks into the average rating for the easiness-of-use of each register IT tool, as reported by the users, on a scale from 1 ('Very difficult') to 5 ('Very easy'). In case a negative assessment is reached (e.g. 'Very difficult' or 'Difficult'), the respondents are invited to tick among possible reasons.

The scope of the indicator includes the IT tools for the railway vehicles, rules and infrastructure registers.

For the users it is important that railway registers are implemented via user friendly IT tools, which ensure easy access to the data they are searching for. The indicator can support the Agency in identifying if there are significant issues reported in view of their progressive elimination.

What is the desired target value?

The desired target value for this indicator is to reach an overall rating equal or higher than 4 ('Easy') for each register IT tool.

How reliable is the data?

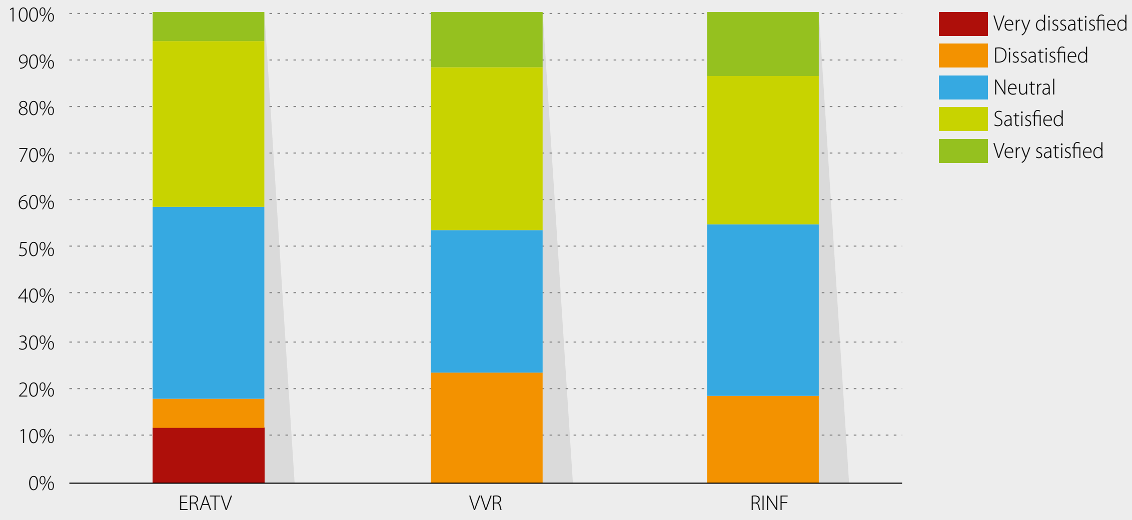
The indicator is implemented by means of an online survey embedded in the registers' IT tools, which record and retrieve the feedback from the users as regards the usability of the respective IT tools.

The reliability of the indicator depends on the respondent sample size compared to the total number of users of a given register. Given the number of valid replies, the values should be interpreted with caution.

What can we learn from the reported data?

More than 40% of respondents reported their satisfaction with the usability of the IT tool for each of the registers, while less than 25% are dissatisfied with the usability of the IT tool (Figure 59). Those users provided explanations for their dissatisfaction, which included poor/incomplete data records, specific IT functionalities, or poor response to their business needs.

Figure 59: Average reported usability for the registers' IT tools, ERA survey 2018



Source: ERA survey, Sample size: 17 (ERATV), 26 (VVR), 22 (RINF)

Annexes


Doornik Kortrijk
40 Bru-Luxembourg Ottignies L 15
Bru-Luxembourg Ottignies
IC 10
IC 16
IC 17

Annex 1 – Overview of TSI updates

Table 1a: Structural TSIs and their amendments, by year (DoA-date of application, EiF-entry into force)

Year	INF		ENE		TSI SRT	TSI PRM	RST				CCS		Year
	HS TSI INF	CR TSI INF	HS TSI ENE	CR TSI ENE			HS TSI RST	CR TSI LOC&PAS	CR TSI WAG	TSI NOI	HS TSI CCS	CR TSI CCS	
1999											Decision 1999/569 on basic parameters EiF: 29/07/1999		1999
2000													2000
2001											Decision 2001/260 on basic parameters		2001
2002	Decision 2002/732 **(1st HS INF TS)** EiF: 30/11/2002		Decision 2002/733 **(1st HS ENE TSI)** EiF: 30/11/2002				Decision 2002/735 **(1st HS RST TSI)** EiF: 30/11/2002				Decision 2002/731 **(1st HS CCS TSI)**		2002
2003													2003
2004									Decision 2004/446 (on basic parameters)	Decision 2004/446 (on basic parameters) (CR only)	Decision 2004/447 (amendment Annex A)	Decision 2004/447 (on basic parameters)	2004
2005													2005
2006										Decision 2006/66 **(1st NOI TSI)** (CR only) DoA: 8/8/2006	Decision 2006/860 **(2nd HS CCS TSI)** DoA: 7/11/2006	Decision 2006/679 **(1st CR CCS TSI)** DoA: 28/9/2006	2006
2007											Decision 2007/153 (amendment Ann. A) DoA: 6/3/2007	Decision 2007/153 (amendment Ann. A) DoA: 7/3/2007	2007
2008	Decision 2008/217 **(2nd HS INF TS)** EiF: 21/12/2007 DoA: 1/7/2008		Decision 2008/284 **(2nd HS ENE TSI)** EiF: 6/3/2008 DoA: 1/10/2008		Decision 2008/163 **(1st SRT TSI)** EiF: 21/12/2007 DoA: 1/7/2008	Decision 2008/164 **(1st PRM TSI)** EiF: 27/12/2007 DoA: 1/7/2008	Decision 2008/232 **(2nd HS RST TSI)** EiF: 21/2/2008 DoA: 1/9/2008		Decision 2006/861 **(1st CR WAG TSI)** DoA 31/01/2008		Decision 2008/386 (amendment Ann. A) DoA: 1/6/2008	Decision 2008/386 (amendment Ann. A) DoA: 1/6/2008	2008

Table 1a: Structural TSIs and their amendments, by year (DoA-date of application, EiF-entry into force) (continued)

<table>
<tr><th rowspan="2">Year</th><th colspan="2">INF</th><th colspan="2">ENE</th><th rowspan="2">TSI SRT</th><th rowspan="2">TSI PRM</th><th colspan="4">RST</th><th colspan="2">CCS</th><th rowspan="2">Year</th></tr>
<tr><th>HS TSI INF</th><th>CR TSI INF</th><th>HS TSI ENE</th><th>CR TSI ENE</th><th>HS TSI RST</th><th>CR TSI LOC&PAS</th><th>CR TSI WAG</th><th>TSI NOI</th><th>HS TSI CCS</th><th>CR TSI CCS</th></tr>
<tr><td>2009</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="3">Decision 2009/107 (amendment)
DoA: 1/7/2009</td><td></td><td></td><td>Decision 2009/561 (amendment ch.7)
DoA: 1/9/2009</td><td>2009</td></tr>
<tr><td>2010</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="2">Decision 2010/79 (amendment Ann. A)
DoA: 1/4/2010</td><td rowspan="2">Decision 2010/79 (amendment Ann. A)
DoA: 1/4/2010</td><td>2010</td></tr>
<tr><td>2011</td><td></td><td>Decision 2011/275 (1st CR INF TSI)
DoA: 1/6/2011</td><td></td><td>Decision 2011/274 (1st CR ENE TSI)
DoA: 1/6/2011</td><td>Decision 2011/291 (amendment)
DoA: 1/6/2011</td><td></td><td></td><td>Decision 2011/291 (1st CR LOC&PAS TSI)
DoA: 1/6/2011</td><td>Decision 2011/229 (2nd NOI TSI)</td><td>2011</td></tr>
<tr><td rowspan="2">2012</td><td>Decision 2012/462 (Amendment of Decision 2002/732 etc.)
DoA: 24/1/2013</td><td></td><td>Decision 2012/462 (Amendment of Decision 2002/733 etc.)
DoA: 24/1/2013</td><td></td><td></td><td></td><td>Decision 2012/462 (Amendment of Decision 2002/735 etc.)
DoA: 24/1/2013</td><td></td><td></td><td>Decision 2012/462 (Amendment of Decision 2006/66 etc.)
DoA: 24/1/2013</td><td colspan="2">Decision 2012/696 (amendment annexes A and G)
DoA: 23/7/2012</td><td rowspan="2">2012</td></tr>
<tr><td colspan="10" rowspan="2">Decision 2012/464/EU:
amending Decisions 2006/861/EC, 2008/163/EC, 2008/164/EC, 2008/217/EC, 2008/232/EC, 2008/284/EC, 2011/229/EU, 2011/274/EU, 2011/275/EU, 2011/291/EU etc.
DoA: 24/1/2013</td><td rowspan="2">Decisions 2012/462 and 2012/463 (amendment)
DoA: 24/1/2013</td><td rowspan="2">Decision 2012/463 amendment
DoA: 24/1/2013</td></tr>
<tr><td rowspan="2">2013</td><td rowspan="2">2013</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Regulation 321/2013 (2nd WAG TSI)
EiF: 13/4/2013
DoA: 1/1/2014</td><td></td><td colspan="2">Decision 2012/88 (1st merged CCS TSI)
DoA: 1/1/2013</td></tr>
<tr><td>2014</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Regulation 1236/2013 amendment
EiF: 4/12/2013
DoA: 1/1/2014</td><td></td><td></td><td></td><td>2014</td></tr>
<tr><td>2015</td><td colspan="2">Regulation 1299/2014 (1st merged INF TSI)
EiF/DoA: 1/1/2015</td><td colspan="2">Regulation 1301/2014 (1st merged ENE TSI)
EiF/DoA: 1/1/2015</td><td>Regulation 1303/2014 (2nd SRT TSI)
EiF/DoA: 1/1/2015</td><td>Regulation 1300/2014 (2nd PRM TSI)
EiF/DoA: 1/1/2015</td><td colspan="2">Regulation 1302/2014 (2nd LOC&PAS TSI)
EiF/DoA: 1/1/2015</td><td>Regulation 2015/924
amendment
DoA: 01/07/2015</td><td>Regulation 1304/2014 (3rd NOI TSI)
EiF/DoA: 1/1/2015</td><td colspan="2">Decision (EU) 2015/14
(amendment)
DoA: 1/7/2015</td><td>2015</td></tr>
<tr><td>2016</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td colspan="2">Commission Regulation (EU) 2016/919 (Recast)
EiF: 05/07/2016</td><td>2016</td></tr>
</table>

Table 1b. Functional TSIs and their amendments, by year (DoA-date of application, EiF-entry into force)

<table>
<tr><th rowspan="2">Year</th><th colspan="2">TSI OPE</th><th colspan="2">TA</th></tr>
<tr><th>HS TSI OPE</th><th>CR TSI OPE</th><th>CR TSI TAF</th><th>TSI TAP</th></tr>
<tr><td>2002</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2003</td><td>Decision 2002/734
(1st HS OPE TSI)
DoA: 12/3/2003</td><td></td><td></td><td></td></tr>
<tr><td>2004</td><td></td><td></td><td rowspan="2">Decision 2004/446
on basic parameters</td><td></td></tr>
<tr><td>2005</td><td></td><td></td><td></td></tr>
<tr><td>2006</td><td></td><td></td><td rowspan="2">Regulation 62/2006
(1st TAF TSI)
EiF: 19/1/2006</td><td></td></tr>
<tr><td>2007</td><td></td><td rowspan="2">Decision 2006/920
(1st CR OPE TSI)
DoA: 18/05/2007</td><td></td></tr>
<tr><td>2008</td><td rowspan="2">Decision 2008/231
(2nd HS OPE TSI)
DoA: 1/9/2008</td><td></td><td></td></tr>
<tr><td>2009</td><td>Decision 2009/107
(amendment)
DoA: 1/7/2009</td><td></td><td></td></tr>
<tr><td>2010</td><td>Decision 2010/640
(amendment)
DoA: 25/10/2010 and 1/1/2014**</td><td>Decision 2010/640
(amendment)
DoA: 25/10/2010 and 1/1/2014**</td><td></td><td></td></tr>
<tr><td>2011</td><td></td><td>Decision 2011/314
(2nd CR OPE TSI)
DoA: 1/1/2012***</td><td></td><td>Regulation 454/2011
(1st TAP TSI)
EiF: 13/5/2011</td></tr>
<tr><td>2012</td><td colspan="2">Decision 2012/464
amending Decisions 2008/231/EC and 2011/314/EU etc.</td><td>Regulation 328/2012
(amendment)
EiF: 08/5/2012</td><td>Regulation 665/2012
(amendment)
EiF: 22/7/2012</td></tr>
<tr><td>2013</td><td colspan="2"></td><td>Regulation 280/2013
(amendment)
EiF: 24/3/2013</td><td>Regulation 1273/2013
(amendment)
EiF: 8/12/2013</td></tr>
<tr><td>2014</td><td colspan="2">Decision 2012/757
OPE:2012
(1st merged OPE TSI)
DoA: 1/1/2014
Decision 2013/710
OPE:2012:A1:2013
(amendment appendix A)
DoA: 1/1/2014</td><td></td><td></td></tr>
<tr><td>2015</td><td colspan="2">Regulation 2015/995
amending Decision 2012/757/EU
EIF/DoA: 20/07/2015</td><td>Regulation 1305/2014
(2nd TAF TSI)
EiF/DoA: 1/1/2015</td><td></td></tr>
</table>

** DoA 1/1/2014 is only for point 6 of Annex I and point 5 of Annex II

*** Appendices P and Pa have different dates of application, i.e. Appendix P applies from 1/1/2012 until 31/12/2013; Appendix Pa applies from 1/1/2014.

Annex 2 – Registers and databases related to ERA's scope of work

ECVVR

The European Centralised Virtual Vehicle Register (ECVVR) refers to Article 47 of the Interoperability Directive (EU) 2016/797 and consists of the National Vehicle Registers (NVR) in the MSs and the Virtual Vehicle Register (VVR) (a search engine linked to all NVRs). The common technical specifications are set out in a Commission Decision (NVR Decision 2007/756/EC). The NVR Decision defines the system architecture, the list of parameters as well as a common data format of the NVR and mandates the Agency to develop the ECVVR system. The ECVVR has been put in service in 2010.

ERADIS

The European Railway Agency Database of Interoperability and Safety (ERADIS) is used for the collection and publishing of safety-relevant documents and interoperability-relevant documents. ERADIS refers to Article 37(3) of Regulation (EU) 2016/796 (Agency Regulation).

ERAIL

The ERAIL database shall ensure that the information relevant to the safety of the railways in the Member States is accessible and transparent to all interested parties and stakeholders in the railway.

ERATV

The European Register of Authorised Types of Vehicles (ERATV) refers to Article 48 of Interoperability Directive (EU) 2016/797 and provides the technical characteristics of types of vehicles authorized in the different Member States. The common technical specifications of the register are set out in a Commission Implementing Decision (ERATV Decision 2011/665/EU). ERATV is in operation since January 2013. The ERATV is hosted by the Agency, while the data are provided by the national safety authorities that have authorised the type of vehicle.

RDD

The Agency makes available the Reference Document Database (RDD) in order to facilitate the access to the rules applied in conjunction with the authorisation of railway vehicles in the Member States of the European Union plus Norway.

RINF

The European Register of Infrastructure (RINF) refers to Article 49 of Directive (EU) 2016/797 and provides for transparency concerning the main features of the European Railway infrastructure. The common technical specifications are set out in the RINF Implementing Decision 2014/880/EU. The main purpose of the RINF is to provide transparency on the characteristics of the EU's railway network and to allow the execution of preliminary vehicle-route compatibility checks in the future. As provided by the Implementing Decision, the RINF Common User Interface (RINF CUI) is a web-based application hosted and maintained by the Agency.

VKMR

The Vehicle Keeper Marking Register (VKM Register) is defined in Appendix 6 part 1 of the NVR Decision 2007/756/EC. This register provides the unique VKM and name of all keepers (EU/OTIF). Since May 2014 a joint OTIF/EU VKM Register is hosted by the Agency and provides the VKM details in four languages (English, French, German, Russian).

Annex 3 – Serious railway accidents in 2017

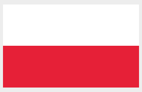
Figure 60: List of serious accidents in 2017

Event:	Collision between a passenger train and a freight train
Date, time and location:	14 February 2017, 08:45 **Dudelange**, Luxembourg
Outcomes:	1 fatality, 1 seriously injured
Notification (ERAIL):	LU-5259
Short description:	Head on collision between a passenger train and a freight train, at Dudelange. Passenger train had passed a signal at danger due to a defective automatic train protection (ATP) system on the train.

Event:	Passenger train derailment
Date, time and location:	18 February 2017, 13:11, **Leuven**, Belgium
Outcomes:	1 fatality and 2 serious injuries (all passengers on the train)
Notification (ERAIL):	BE-5266
Short description:	Shortly after leaving Leuven station, the train derailed and the front coach of the train overturned.

Event:	Level crossing accident
Date, time and location:	12 March 2017, 17:29, **Sompa level crossing,** Estonia
Outcomes:	2 fatalities (car passengers)
Notification (ERAIL):	EE-5277
Short description:	A car was in collision with a train at a level crossing. The driver of the car was under narcotic intoxication and failed to correctly assess the risks of the crossing which was closed to road traffic to allow the passage of a train.

Event:	Accident to persons caused by rolling stock in motion
Date, time and location:	13 March 2017, 09:52, **Meppen,** Germany
Outcomes:	1 fatality (employee)
Notification (ERAIL):	DE-5284
Short description:	Member of infrastructure manager staff was hit by a passenger train at Meppen railway station.



Event:	Level crossing accident
Date, time and location:	04 April 2017, 17:34, **Chelm,** Poland
Outcomes:	1 fatality and 1 serious injury (occupants of the car)
Notification (ERAIL):	PL-5320
Short description:	Train was in collision with car on a level crossing. The level crossing keeper had failed to lower the barriers to prevent cars using the crossing while the train passed.

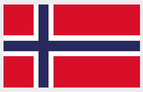
Event:	Train derailment
Date, time and location:	08 April 2017, 14:05, **Merisor - Banita**, Romania
Outcomes:	2 train driver fatalities
Notification (ERAIL):	RO-5323
Short description:	A locomotive and 14 wagons from freight train no.50457 derailed between Banita and Merisor railway stations. The locomotive drivers had lost control of their train having consumed alcohol. The loss of control was directly related to the lack of air brake control of the wagons. The train derailed on a curve at 92 km/h where the maximum permitted speed was only 40 km/h.

Event:	Level crossing accident
Date, time and location:	20 April 2017, 13:32, **Wels**, Austria
Outcomes:	1 fatality (level crossing user)
Notification (ERAIL):	AT-5493
Short description:	A local passenger train collided with a pick-up truck at a closed level crossing.

Event:	Train derailment
Date, time and location:	13 May 2017, 21:40, **Adendro,** Greece
Outcomes:	There were 3 fatalities (including 2 train staff and 1 passenger) as well as 1 seriously injured train staff, 9 other injured persons (7 passengers and 2 train staff) and material damage
Notification (ERAIL):	EL-5358
Short description:	Train number 58, an Intercity train, going from Athina to Salonica derailed at Adendro Railway Station and then collided with a nearby building.

Event:	Level-crossing accident
Date, time and location:	15 May 2017, 10:46, **Neustadt am Rübenberge - Hagen (Han)**, Germany
Outcomes:	1 fatality (level crossing user), 10 passengers injured and material damage.
Notification (ERAIL):	DE-5345
Short description:	Regional passenger train hit a truck on a level crossing.

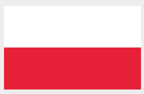
Event:	Accident to persons caused by rolling stock in motion
Date, time and location:	01 June 2017, 15:55, **Trenos, near Llanharan,** Wales
Outcomes:	1 fatality (Footpath crossing user)
Notification (ERAIL):	UK-5366
Short description:	A freight train consisting of 22 empty diesel fuel tank wagons derailed due to a track misalignment. Two wagons derailed but remained upright.



Event:	Level crossing accident
Date, time and location:	24 June 2017, **Opphus,** Norway
Outcomes:	1 fatality (level crossing user)
Notification (ERAIL):	NO-5382
Short description:	A car collided with a passenger train at Kroken level crossing, close to Opphus station.

Event:	Accident to persons caused by rolling stock in motion
Date, time and location:	21 September 2017, 07:10, **Oostende,** Belgium
Outcomes:	1 fatality (employee)
Notification (ERAIL):	BE-5444
Short description:	A train collided with a trainee of a contracting company working on the tracks near Oostende railway station.

Event:	Level crossing accident
Date, time and location:	26 October 2017, 08:00, **Raasepori, Skogby level crossing,** Finland
Outcomes:	4 fatalities (3 level crossing users and 1 passenger – who died from a heart attack), 4 serious injuries and 1 other injury (all level crossing users).
Notification (ERAIL):	FI-5479
Short description:	A passenger train collided with a Military off-road truck on Skogby level crossing near Raasepori.

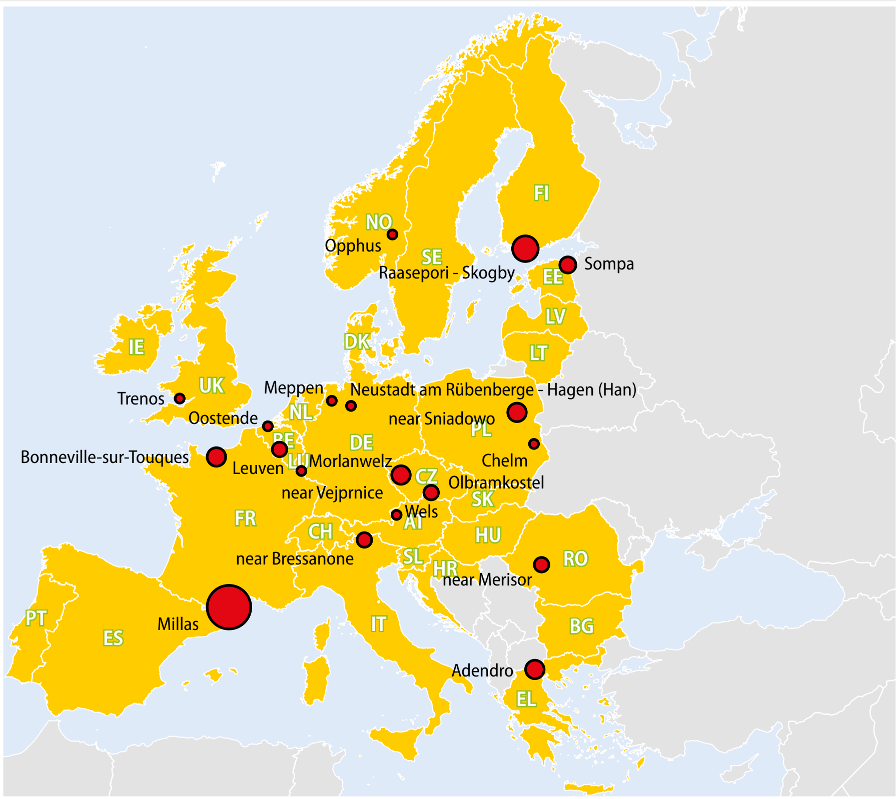


Event:	Level crossing accident
Date, time and location:	02 November 2017, 07:43, **between Śniadowo – Łapy stations,** Poland
Outcomes:	3 fatalities and 1 serious injuries (all level crossing users)
Notification (ERAIL):	PL-5488
Short description:	A car hit a railway maintenance vehicle at a level crossing. As the consequence of the collision 3 passengers from the car died and 1 passenger of the car was seriously injured.

Event:	Railway vehicle movement events followed by an accident to persons caused by rolling stock in motion
Date, time and location:	27 November 2017, 19:45, **Morlanwelz**, Belgium
Outcomes:	2 fatalities (employees), 3 serious injuries (2 passengers and 1 employee) and 5 other passengers injured.
Notification (ERAIL):	BE-5514
Short description:	Following a collision with a vehicle on level crossing in Morlanwelz, a fire destroyed the driving cab of the Electrical multiple unit train (EMU). After the accident, the line was closed in order to allow the evacuation of the train involved in the accident to perform repairs to the infrastructure. At 19:43, during the evacuation of the 2-car train by moving the train to the railway station at Piéton, the damaged railcar ran away, in freewheel mode and without any staff, on a gradient in the direction of La Louvière-Sud. During its passage through Morlanwelz station, the railcar ran down and killed some employees of Infrabel who were performing repairs to the infrastructure. The train continued, passing through different points including La Louvière railway station before crashing into the rear part of EMU train E940 which was running on the service at Braquegnies.

Source: ERAIL

Figure 61: Location of the serious accidents in 2017 and their magnitude (FWSI)



Source: ERAIL

Figure 62: Location of all railway incidents and accidents notified in ERAIL, 2017

Source: ERAIL

Annex 4 – List of new lines, high-speed (HS) and conventional rail (CR) opened during the reporting period

Member State	Railway line no.	National identification (e.g. origin/destination name)	Length in km	Year	Type (HS/CR)
BE	50C	Y. Brussel-Klein Eiland - Y. Sint-Katharina-Lombeek	15	2016	CR
BE	161A	Brussel-Schuman - Y. Jubelpark	1.5	2016	CR
BE	219	Bundel Zandeken - Gent-Kluizendok-Zuid	3.8	2016	CR
BE	26/4	Etterbeek - Y.Boondaal	1.7	2016	CR
BE	36/3	Y.Harenheide - Y.Diegem	1	2017	CR
BE	211/2	Y. Haandorp - Y. Aven Ackers	0.8	2017	CR
DE	2972	Abschnitt Korbach Süd - Herzhausen	11	2015	CR
DE	3658	Abschnitt Zeppelinheim - Frankfurt(Main) Stadion	3	2015	CR
DE	5919	Abschnitt Erfurt und Planena	96	2016	HS
DE	5919	Teilstrecke Eltersdorf - Erlangen	6	2016	CR
DE	5027	Abschnittes Staatsgrenze Tschechien /Deutschland - Selb-Plößberg	6	2016	CR
DE	6394	Abschnitt Planena–Halle-Ammendorf	4	2016	CR
DE	6752	Anschluss eines anderen Eisenbahnverkehrsunternehmen	4	2016	CR
DE	5919	Abschnitt Erlangen - Baiersdorf	8	2017	HS
DE	6239	Abschnitt Dresden-Neustadt - Radebeul Ost	4	2017	CR
DE	6348	Knoten Halle	1	2017	CR
DE	6431	Abzweig Zeitz nach Zeitz	1	2017	CR
DE	5113	Knoten Forchheim	1	2017	CR
ES	850	Eje Atlántico AV. Tramo Vigo Urzáiz-Santiago de Compostela. Subsistemas INF, ENE y CMS	17.562	2015	HS
ES	824	Eje Atlántico AV. Tramo Bifurcación Arcade-Vilagarcía de Arousa. Subsistema ENE	45.948	2015	HS
ES	824	Eje Atlántico AV. Tramo Vilagarcía de Arousa-Bifurcación Angueira. Subsistemas INF, ENE y CMS	25.770	2015	HS
ES	824	Eje Atlántico AV. Tramo Bifurcación Angueira-Santiago de Compostela. Subsistema ENE	14.483	2015	HS
ES	848	Eje Atlántico AV. Tramo Redondela AV-Bifuracación Redondela. Subsistemas INF, ENE y CMS	1.040	2015	HS
ES	080	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Valladolid-Bifurcación Venta de Baños. Subsistemas INF, ENE y CMS	38.266	2015	HS
ES	084	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Bifurcación Venta de Baños-León. Subsistemas INF, ENE y CMS	127.859	2015	HS
ES	158	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Bifurcación Cerrato-Cambiador Villamuriel. Subsistemas INF, ENE y CMS	1.900	2015	HS
ES	156	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Cambiador Villamuriel-Bifurcación Villamuriel de Cerrato. Subsistemas INF, ENE y CMS	0.400	2015	CR
ES	180	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Bifurcación Estadio Municipal-Cambiador Clasificación. Subsistemas INF, ENE y CMS	0.400	2015	HS
ES	182	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Cambiador Clasificación-Bifurcación Clasificación. Subsistemas INF, ENE y CMS	0.400	2015	CR

Member State	Railway line no.	National identification (e.g. origin/destination name)	Length in km	Year	Type (HS/CR)
ES	186	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Bifurcación Cambiador Vilecha-Cambiador Vilecha. Subsistemas INF, ENE y CMS	0.600	2015	HS
ES	184	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Cambiador Vilecha-Bifurcación Río Bernesga. Subsistemas INF, ENE y CMS	0.400	2015	CR
ES	120	Cambio en las condiciones de explotación. Tramo Medina del Campo-Salamanca. Subtramo Medina del Campo-Salamanca. Subsistemas INF, ENE y CMS	76.900	2015	CR
ES	188	Cambio en las condiciones de explotación. Tramo Medina del Campo-Salamanca. Subtramo Cambiador de Medina-Bifurcación Arroyo de la Golosa. Subsistemas INF, ENE y CMS	2.962	2015	CR
ES	982	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Bifurcación Medina-Zamora AV. Subsistemas INF, ENE y CMS	98.579	2015	HS
ES	190	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Cambiador Medina-Medina del Campo AV. Subsistemas INF, ENE y CMS	1.110	2015	HS
ES	886	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Cambiador Zamora-Zamora AV. Subsistemas INF, ENE y CMS	0.581	2015	HS
ES	884	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Bifurcación Bolón-Cambiador Zamora. Subsistemas INF y CMS	0.213	2015	CR
ES	400	Utrera/Las Cabezas de San Juan. PK 33+206-PK 55+503 (fase 2)	22.297	2015	HS
ES	400	Utrera/Las Cabezas de San Juan. PK 32+306-PK 33+346 (fase 3)	1.040	2015	HS
ES	400	Utrera/Las Cabezas de San Juan. PK 45+422-PK 45+531 (fase 3)	0.109	2015	HS
ES	982	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Estación de Medina del Campo AV Fase 1 Andén 2. Subsistema INF	0.4	2016	HS
ES	08-782	Soterramiento Basurto Hospital-Ariz. Tramo 2 Rekalde-Irala. Subsistema INF y CMS (gauge 1000)	2.072	2016	CR
ES	08-770	Electrificación Tramo Arriondas-Ribadesella. Línea Oviedo-Santander. Subsistema ENE (gauge 1000)	17.951	2017	CR
ES	982	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Estación de Medina del Campo AV Fase 2. Subsistema INF	0.4	2017	HS
ES	44	Primera fase de implantación del ancho estándar en el tramo València - Castelló.Nueva línea 044, Bif. Joaquín Sorolla (UIC) – Bif. Jesús PK inicio: 1+624 – PK final: 2+121	0.497	2017	HS
ES	600	Primera fase de implantación del ancho estándar en el tramo València - Castelló.Modificación de la línea 600, Valéncia E. Nord a Sant Vicenç de Calders, PK inicio: 2+121 – PK final: 73+792	71.671	2017	HS
PL	248	GDAŃSK WRZESZCZ- GDAŃSK OSOWA	1.927	2015	CR
PL	253	GDAŃSK RĘBIECHOWO - GDAŃSK OSOWA R1	0.065	2015	CR
PL	625	Sucha Beskidzka Połmoc - Sucha Beskidzka Południe	0.658	2015	CR
PL	747	Szymany - Szymany lotnisko	1.569	2015	CR
PL	906	Chotyłów - Mętraki	0.149	2015	CR
PL	458	Łódź Fabryczna - Łódź Widzew	3.485	2016	CR
PL	558	Skierniewice R24 - Skierniewice R402	3.104	2016	CR
PL	585	Radom - Radom Wschodni	0.868	2016	CR
PL	624	Kraków Zabłocie - Kraków Bonarka	3.161	2016	CR
PL	800	Poznań Franowo PFD-Poznań Franowo PFB	0.275	2016	CR
PL	865	Magdalenka - Małaszewicze Centralne (MSC)	0.085	2016	CR
PL	867	Małaszewicze Centralne (MSC) - Małaszewicze (MSE)	0.091	2016	CR
RO	100	Ișalnița - Coțofeni	5.611	2016	CR
RO	200	Şibot - Aurel Vlaicu - Orăștie	9.639	2016	CR
RO	200	Ghioroc - Arad and L7 Arad	17.738	2016	CR
RO	200	Arad - Curtici	12.94	2016	CR
RO	200	Curtici - Border	5.595	2016	CR
RO	100	L1 upgraded - Valea Albă	0.97	2017	CR
RO	100	Ișalnița - Coțofeni	5.616	2017	CR
RO	203	L3 upgraded - Bujoreni	2.104	2017	CR
RO	200	Şibot - Aurel Vlaicu	3.296	2017	CR

Member State	Railway line no.	National identification (e.g. origin/destination name)	Length in km	Year	Type (HS/CR)
FI	14+500 - 32+680	Kehärata (Huopalahti-Havukoski)	18	2015	CR
FI	71+883 - 72+951	Riihimäen kolmioraide	1	2017	CR
NO	700	Dovre line, Langseth-Kleverud	16.5	2015	CR
NO	Dovre line	Between Nypan and Heimdal stations. Reorganisation of track in connection with new main road (E6)	0.910	2016	CR
NO	Nordland line	Between Hell and Stjørdal stations. New bridge across the river Stjørdalselva, Double track, width 10 m.	0.200	2016	CR
NO	1510	Vestfold line	14.8	2016	CR

Source: NSA survey

Annex 5 – List of lines (HS/CR) closed during reporting period

Member State	Railway line no	National identification (e.g. origin/destination name)	Length in km	Year	Type (HS/CR)
BE	155	Marbehan - Croix Rouge	12	2015	CR
BE	288	Floreffe - Parc Industriel de la basse Sambre	2.3	2015	CR
BE	289	Y.Saint-Lambert - Parc industriel de Gantaufet	5	2015	CR
DK	TIB 36	Grenaa-Aarhus	64	2016	CR
DK		Odder-Aarhus	27	2016	CR
DE	6935	Abschnitt Parchim - Karow	34	2015	CR
DE	6880	38 km nach Verpachtung der Strecke 6880 Biederitz – Altengrabow (RegN)	38	2015	CR
DE	2262	9 km nach Stilllegung der Strecke 2262 Oberhausen-Osterfeld – Bottrop (FuB)	9	2015	CR
DE	6290	4 km im Knoten Erfurt im Rahmen des Verkehrsprojektes Deutsche Einheit (VDE) 8.2 Neubaustrecke Erfurt – Halle/Leipzig (FuB)	4	2015	CR
DE	6775	3 km nach Verkauf des Abschnittes zwischen Putbus und Lauterbach (Mole) auf der Strecke 6775 Bergen auf Rügen – Lauterbach (Mole) (RegN)	3	2015	CR
DE	6613	3 km nach Verpachtung des Abschnittes zwischen Rhäsa und Nossen der Strecke 6613 Riesa – Nossen (FuB)	3	2015	CR
DE	4520	3 km nach Stilllegung der Strecke 4520 zwischen Niederbiegen und Abzweig Weingarten (FuB) sowie der Strecke 4521 zwischen Abzweig Weingarten und Baienfurt (FuB)	3	2015	CR
DE	6386	Streckenabschnitt Döbeln - Meißen	37	2016	CR
DE	6850	Helbra – Wippra	20	2016	CR
DE	5231	Abschnitt Schweinfurt-Sennfeld - Gochsheim	3	2016	CR
DE	6193	Abschnitt Senftenberg - Brieske	3	2016	CR
DE	6806	Abschnitt Bad Lauchstädt - Schafstädt	7	2017	CR
DE	6269	Abschnitt Abzweig Gera-Debschwitz - Wolfsgefärth	4	2017	CR
DE	6003	Knoten Berlin-Ostbahnhof/Ostkreuz	3	2017	CR
DE	2733	Abschnitt Anschluss Gruiten-Wuppertal - Anschluss Vohwinkel	3	2017	CR
DE	1724	Anschlusses zu einem Fremdbetreiber	2	2017	CR
DE	6752	Abschnitt Templin Stadt - Templin-Fährkrug	2	2017	CR
DE	6588	Abschnitt Eibau - Abzweig Eibau	1	2017	CR
DE	6172	Berlin-Mariendorf nach Berlin-Tempelhof	1	2017	CR
DE	6613	Abschnitt Starbach - Nossen	1	2017	CR
DE	6803	Abschnitt Grockstädt - Vitzenburg	1	2017	CR
DE	6815	Abschnitt Abzweig Zeitz - Zeitz	1	2017	CR
LU	Line 2a	Kleinbettingen - Steinfort	3.2	2017	CR
NL		Schiedam - Hoek van Holland	24.0	2017	
PL	170	JASTRZĘBIE ZDRÓJ MOSZCZENICA - ZEBRZYDOWICE	13.409	2015	CR
PL	178	ZABRZE MIKULCZYCE - TWORÓG	25.693	2015	CR
PL	198	PYSKOWICE - PYSKOWICE MIASTO	2.59	2015	CR
PL	239	MOGILNO - ORCHOWO	19.76	2015	CR
PL	319	STRZELIN - KONDRATOWICE	18.259	2015	CR
PL	321	PRZEWORNO - GŁĘBOKA ŚLĄSKA	12.43	2015	CR
PL	328	NYSA - KOPERNIKI	8.375	2015	CR
PL	330	KAMIENNA GÓRA - KRZESZÓW	7.964	2015	CR
PL	334	KAMIENIEC ZĄBKOWICKI - ZŁOTY STOK	11.182	2015	CR
PL	335	HENRYKÓW - CIEPŁOWODY	10.406	2015	CR

Member State	Railway line no	National identification (e.g. origin/destination name)	Length in km	Year	Type (HS/CR)
PL	338	FOSOWSKIE - DOBRODZIEŃ	8.101	2015	CR
PL	338	FOSOWSKIE - DOBRODZIEŃ	2.139	2015	CR
PL	384	SULECHÓW - ŚWIEBODZIN	27.549	2015	CR
PL	388	KONIN - KAZIMIERZ BISKUPI	5.5	2015	CR
PL	416	WAŁCZ RADUŃ - WIERZCHOWO POMORSKIE	37.925	2015	CR
PL	518	ŁĘGÓWEK - LESK	1.304	2015	CR
PL	690	JASTRZĘBIE ZDRÓJ MOSZCZENICA R 22 - JASTRZĘBIE ZDRÓJ MOSZCZENICA R 21	0.394	2015	CR
PL	744	LIPOWA TUCHOLSKA - SZLACHTA ZACHÓD	1.699	2015	CR
PL	769	OPOLE ZACHODNIE OP2-OPOLE ZACHODNIE OPZ1	0.88	2015	CR
PL	875	WODZISŁAW ŚLĄSKI - KWK 1 MAJA	0.178	2015	CR
PL	910	NOWOSADY - CHRYZANÓW	4.289	2015	CR
PL	914	NAREWKA - WIĄCKÓW	5.419	2015	CR
PL	916	SIEMIANÓWKA - WIĄCKÓW (SZ)	3.91	2015	CR
PL	938	WARSZAWA JELONKI - RADIOWO	0.105	2015	CR
PL	948	KRAKÓW TOWAROWY - KRAKÓW GŁÓWNY OSOBOWY T3	1.585	2015	CR
PL	949	KRAKÓW TOWAROWY - KRAKÓW GŁÓWNY OSOBOWY T4	0.625	2015	CR
PL	307	Namysłów - Kępno	2.247	2016	CR
PL	314	Trzebień- Modła	17.887	2016	CR
PL	331	Jawor-Roztoka	2.842	2016	CR
PL	378	Gołańcz-Chodzież	0.101	2016	CR
PL	662	D.G.Huta Katowice- D.G.Piekło	3.254	2016	CR
PL	917	Łódź Widzew- Łódź Janów	0.39	2016	CR
PL	956	KĘZIERZYN KOŹLE KKC - KĘDZIERZYN KOŹLE KKB	2.187	2016	CR
PL	80	Furmany - Olendry	3.68	2017	CR
PL	84	Grębów - Olendry	3.737	2017	CR
RO	100	L1 Valea Albă	0.97	2015	CR
RO	100	Işalniţa - Coţofeni	5.611	2016	CR
RO	200	Şibot - Aurel Vlaicu	3.296	2016	CR
RO	100	L2 Valea Albă	1.75	2017	CR
RO	200	Orăştie - Turda - Simeria	15.705	2017	CR
RO	200	Aurel Vlaicu - Orăştie	6.343	2017	CR
RO	200	Bârzava - Conop	8.512	2017	CR
RO	200	L3 Păuliş	1	2017	CR
RO	200	L2 Ghioroc	1.186	2017	CR
RO	503	Mărăşeşti - Panciu	17.37	2017	CR
NO	700	Dovre line, single track closed	16.5	2015	CR
NO	1510	Vestfold line	16	2016	CR

Source: NSA Survey

Annex 6 – List of new or upgraded tunnels and their length

Member State	Tunnel ID	National identification (e.g. origin/destination name)	Length in km	Year	SRT TSI-compliant?
BE	L161A	New Tunnel - Schuman-Josaphat Tunnel	1.25	2016	Yes
BE	L123	Upgraded Tunnel - Overboerlare	0.4	2016	Yes
BE	L161	New Tunnel - Beauvallon (Brussel - Namur)	0.25	2017	In progress
DE	13001956	Strecke: 2690, KM: 81,375-81,525, Bezeichnung: BAB Anschluss Mogendorf	0.15	2015	No
DE	13001161	Strecke: 2972, KM: 050,547-050,747, Bezeichnung: Itter I Tunnel	0.2	2015	No
DE	13001162	Strecke: 2972, KM: 051,172-051,265, Bezeichnung: Itter II Tunnel	0.093	2015	No
DE	13001968	Strecke: 5919, KM: 228,991-235,956, Bezeichnung: Finnetunnel (Röhre 1)	6.965	2016	Yes
DE	13001969	Strecke: 5919, KM: 237,301-243,768, Bezeichnung: Bibratunnel (Röhre 1)	6.467	2016	Yes
DE	13001970	Strecke: 5919, KM: 243,768-237,301, Bezeichnung: Bibratunnel (Röhre 2)	6.467	2016	Yes
DE	13001971	Strecke: 5919, KM: 235,956-228,991, Bezeichnung: Finnetunnel (Röhre 2)	6.965	2016	Yes
DE	13001972	Strecke: 5919, KM: 248,928-251,009, Bezeichnung: Osterbergtunnel (Röhre 1)	2.081	2016	Yes
DE	13001973	Strecke: 5919, KM: 251,009-248,928, Bezeichnung: Osterbergtunnel (Röhre 2)	2.081	2016	Yes
DE	13001979	Strecke: 3600, KM: 22,500-223,435, Bezeichnung: Bebenroth-Tunnel ABBT	0.935	2016	Yes
DE	13001980	Strecke: 3509, KM: 001,665-000,520, Bezeichnung: Wandersmann Tunnel Nord	1.145	2016	No
DE	13002028	Strecke: 5919, KM: 024,942-025,250, Bezeichnung: Burgberg Ost	0.308	2017	Yes
DE	13002029	Strecke: 5200, KM: 070,552-073,175, Bezeichnung: Falkenberg rechte Röhre	2.623	2017	Yes
DE	13002030	Strecke: 5200, KM: 070,500-073,119, Bezeichnung: Falkenberg linke Röhre	2.619	2017	Yes
DE	13002031	Strecke: 5200, KM: 073,358-073,733, Bezeichnung: Hirschberg rechte Röhre	0.375	2017	Yes
DE	13002032	Strecke: 5200, KM: 073,299-073,804, Bezeichnung: Hirschberg linke Röhre	0.505	2017	Yes
DE	13002033	Strecke: 5200, KM: 074,224-074,811, Bezeichnung: Metzberg rechte Röhre	0.587	2017	Yes
DE	13002034	Strecke: 5200, KM: 074,159-074,788, Bezeichnung: Metzberg linke Röhre	0.629	2017	Yes
DE	13002035	Strecke: 5200, KM: 075,122-075,868, Bezeichnung: Hain	0.746	2017	Yes
DE	13002010	Strecke: 5362, KM: 100,784-100,944, Bezeichnung: Tunnel Oberstaufen	0.16	2017	No
DE	13002011	Strecke: 3610, KM: 000,769-000,857, Bezeichnung: Röhre 1b+1c	0.088	2017	No
DE	13002019	Strecke: 3010, KM: 048,418-052,660, Bezeichnung: Alter Kaiser Wilhelm Tunne	4.242	2017	Yes
DE	13002024	Strecke: 3681, KM: 052,642-052,866, Bezeichnung: FRANKFURT (M) HBF (TIEF) - FRANKFURT (M) SÜD	0.244	2017	No
ES	850	Eje Atlántico AV. Tramo Vigo-Das Maceiras. Túnel Das Maceiras	8.3	2015	In process
ES	850	Eje Atlántico AV. Das Maceiras-Redondela. Túnel de Novelle	1.21	2015	In process
ES	850	Eje Atlántico AV. Das Maceiras-Redondela. Túnel artificial de Sampaio de Abajo	0.1	2015	In process
ES	824	Eje Atlántico AV. Tramo Redondela-Soutomaior. Túnel de Redondela	3.584	2015	In process
ES	824	Eje Atlántico AV. Tramo Soutomaior-Vilaboa. Túnel de Xesteira	0.861	2015	In process

Member State	Tunnel ID	National identification (e.g. origin/destination name)	Length in km	Year	SRT TSI-compliant?
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo Vilagarcía de Arousa-Catoira. Túnel de Quinteiro	1.97	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo Vilagarcía de Arousa-Catoira. Túnel de Valicobas	1.351	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo Vilagarcía de Arousa-Catoira. Túnel de Abalo	0.625	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo Vilagarcía de Arousa-Catoira. Túnel de Outeiro	0.56	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo Vilagarcía de Arousa-Catoira. Túnel de Pedras Miudas	0.12	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo A Vacariza-Rialiño. Túnel Nº1	0.352	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo A Vacariza-Rialiño. Túnel Nº2	0.884	2015	In process
ES	824	Eje Atlántico AV. Tramo Variante Vilagarcía de Arousa-Padrón. Subtramo Rialiño-Padrón. Túnel del Bustelo	1.438	2015	In process
ES	080	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Valladolid-Bifurcación Venta de Baños. Túnel de Peña Rayada	1.998	2015	In process
ES	080	Corredor Norte-Noroeste AV. Tramo Valladolid-Palencia-León. Subtramo Valladolid-Bifurcación Venta de Baños. Túnel artificial de Villamuriel del Cerrato	0.35	2015	In process
NL		Willem van Oranjetunnel Delft	2.3	2015	
PL	017-002, 392-001	l.017 km 2,392 (Łódź Fabryczna railway station)	2.392	2017	No
PL	017-002, 392-002	l.017 km 2,392 (Łódź Fabryczna railway station)	2.392	2017	No
PL	017-000, 682-003	l.017 km 2,392 (Łódź Fabryczna railway station)	0.682	2017	No
PL	017-000, 610-004	l.017 km 2,392 (Łódź Fabryczna railway station)	0.61	2017	No
PL	017-000, 591-005	l.017 km 2,392 (Łódź Fabryczna railway station)	0.593	2017	No
PL	017-000, 475-006	l.017 km 2,392 (Łódź Fabryczna railway station)	0.475	2017	No
PL	458-002, 389-009	l.017 km 2,392 (Łódź Fabryczna railway station)	2.389	2017	No
PL	458-002, 389-007	l.017 km 2,392 (Łódź Fabryczna railway station)	2.389	2017	No
RO	600	km 389+551 - km 389+788 Tecuci - Iași - UPGRADED	0.237	2017	Not compliant
FI	21+500 - 29+650	Lentoaseman tunneli (Kehärata)	8	2015	Yes
SE		Hallandsås (2 x single track tunnels)	8.7	2016	No (Derogation, advanced stage)
SE		Citybanan (double track tunnel in Stockholm for commuter trains)	6	2017	No (Derogation, advanced stage)
SE		Gamla Uppsala (double track)	0.62	2017	Yes
NO	Molykja	Molykja, Stange municipality	0.589	2015	Yes
NO	Ulvin	Morskogen, Stange municipality	3.398	2015	Yes
NO	Morstua	Strandlykja, Stange municipality	0.194	2015	Yes
NO	KU-TUN-001287	Holmestrandporten	12.38	2016	Yes
NO	Brennhaugen	Ofot line - Brennhaugen	0.83	2017	Yes

Source: NSA Survey

Annex 7 – List of tunnels closed during the reporting period

Member State	Tunnel ID	National identification (e.g. origin/destination name)	Length in km	Year	SRT TSI-compliant?
DE	13000111	Strecke: 3010, KM: 048,418-052,623, Bezeichnung: Alter Kaiser Wilhelm Tunnel	4.205	2015	No
DE	13000860	Strecke: 6356, KM: 017,616-017,986, Bezeichnung: MERSEBURG - HALLE/NIETLEBEN	0.37	2015	No
DE	13001693	Strecke: 6396, KM 002,032-002,035, Bezeichnung: Leipzig City-Tunnel (Schildtunnel) Querschlag	0.009	2015	No
DE	13000889	Strecke: 6850, KM: 015,297-015,585, Bezeichnung: Rammelburg	0.288	2016	No
DE	13000351	Strecke: 5362, KM: 100,809-100,933, Bezeichnung: Buchloe - Lindau Tunnel	0.124	2017	No
NO	Korslund	Molykja, Stange municipality	0.114	2015	No
NO	N/A	Smørstein	0.6	2016	No

Source: NSA Survey

Annex 8 – List of new and upgraded railway stations placed in service in compliance with PRM TSI

Member State	Station name/ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
BG	Dimitrovgrad	Railway line No. 1 / UIC code: 140004	2017	Yes
BG	Nova Nadezhda	Railway line No. 1 / UIC code: 140046	2017	Yes
BG	Simeonovgrad	Railway line No. 1 / UIC code: 140103	2017	Yes
BG	Harmanli	Railway line No. 1 / UIC code: 140137	2017	Yes
BG	Lyubimets	Railway line No. 1 / UIC code: 140152	2017	Yes
BG	Svilengrad - M	Railway line No. 1 / UIC code: 140202	2017	Yes
DK	Lv	Langeskov station	2016	Yes
DE	8210	Frankenthal Süd	2015	Yes
DE	8252	Dienheim	2015	Yes
DE	7225	Achterwehr	2015	Yes
DE	8295	Bredenbek	2015	Yes
DE	7277	Kiel-Russee	2015	Yes
DE	7257	Kronshagen	2015	Yes
DE	7267	Melsdorf	2015	Yes
DE	7282	Schülldorf	2015	Yes
DE	8300	Lübeck Dänischburg IKEA	2015	Yes
DE	8265	Oldenburg-Wechloy	2015	Yes
DE	8074	Kirchhammelwarden	2015	Yes
DE	8245	Freilassing-Hofham	2015	Yes
DE	918	Hinrichssegen	2015	Yes
DE	5672	Schonungen	2015	Yes
DE	8234	Calbe (Saale) Stadt	2015	Yes
DE	8292	Plauen (Vogtl) Mitte	2015	Yes
DE	7113	Gutach Freilichtmuseum	2015	Yes
DE	8274	Bad Rappenau Kurpark	2015	Yes
DE	8273	Bad Wimpfen im Tal	2015	Yes
DE	8271	Neckarsulm Mitte	2015	Yes
DE	8270	Neckarsulm Nord	2015	Yes
DE	8026	Muggensturm-Badesee	2015	Yes
DE	5397	Rottenacker	2015	Yes
DE	2392	Alfter-Impekoven	2015	Yes
DE	2013	Bonn-Endenich Nord	2015	Yes
DE	8247	Münster-Roxel	2015	Yes
DE	7027	Erlangen Paul-Gossen-Straße	2016	Yes
DE	8092	Dresden Bischofsplatz	2016	Yes
DE	8294	Pulsnitz Süd	2016	Yes
DE	8215	Hohenecken	2017	Yes
DE	2377	Grub (Oberpf)	2017	Yes
DE	8249	Warendorf-Einen-Müssingen	2017	Yes
DE	8213	Bonn UN Campus	2017	Yes
ES	08223	Eje Atlántico AV. Estación de Vigo Urzaiz.	2015	In process
ES	08224	Eje Atlántico AV. Estación de Redondela.	2015	In process

Member State	Station name/ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
ES	B2300	Eje Atlántico AV. Estación de Arcade.	2015	In process
ES	23004	Eje Atlántico AV. Estación de Pontevedra.	2015	In process
ES	23008	Eje Atlántico AV. Estación de Vilagarcía de Arousa.	2015	In process
ES	23020	Eje Atlántico AV. Apeadero de Drodo.	2015	In process
ES	23021	Eje Atlántico AV. Estación de Padrón Barbanza.	2015	In process
ES	30200	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Estación Zamora AV	2015	In process
ES	98304	Line 908, Hortaleza-Aeropuerto T4, Valdebebas	2015	In process
ES	51113	Line 400, Alcazar de San Juan-Cádiz, Jardines de Hércules	2015	In process
ES	70112	Line 200, Madrid Chamartín-Barcelona estación de Francia, soto de Henares	2015	In process
ES	62002	Nueva Estación de Orihuela	2015	In process
ES	10500	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Estación de Medina del Campo AV Fase 1 Andén 2. Línea 982	2016	Yes
ES	65206	Linea 600, Valencia Estación Nord-Sant Vicenç de Calders. Nules	2016	Yes
ES	982	Corredor Norte-Noroeste AV. Tramo Olmedo-Zamora. Subtramo Estación de Medina del Campo AV Fase 2.	2017	Yes
HR	Okučani	M104 Novska - Tovarnik - State border	2016	NO
HR	Zagreb Main Station	M101 State border - Savski Marof - Zagreb Main station	2017	NO
LV	03.01.	dzelzceļa iecirknis Rīga - Jelgava,infr.reģ.ind.Nr. 14 - stacija Jelgava	2016	Yes
LV		dzelzceļa iecirknis Rīga - Jelgava,infr.reģ.ind.Nr. 14 - pieturas punkts Cukurfabrika	2016	Yes
LV	14.03.	dzelzceļa iecirknis Rīga - Jelgava,infr.reģ.ind.Nr. 14 -stacija Olaine	2016	Yes
LV	18.04.	dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 - stacija Sloka	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 - pieturas punkts Vaivari	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 - pieturas punkts Melluži	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 - pieturas punkts Asari	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18- pieturas punkts Pumpuri	2016	Yes
LV	18.03.	dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -stacija Dubulti	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -pieturas punkts Majori	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -pieturas punkts Dzintari	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -pieturas punkts Bulduri	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -pieturas punkts Lielupe	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 - pieturas punkts Babīte	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -pieturas punkts Imanta	2016	Yes
LV		dzelzceļa iecirknis Torņakalns - Tukums 2,infr.reģ.ind.Nr. 18 -pieturas punkts Zolitūde	2016	Yes
LV		dzelzceļa iecirknis Rīga pasažieru - Krustpils,infr.reģ.ind. Nr. 06 - pieturas punkts Ikšķile	2016	Yes

Member State	Station name/ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
LT	Gaižiūnai		2014	1300/2014 PRM (only platforms)
LT	Kyviškės		2015	Non-application of PRM TSI
LT	Valčiūnai		2015	Non-application of PRM TSIs
LT	Kūlupėnai		2015	1300/2014 PRM (only platforms)
LT	Kretinga		2015	1300/2014 PRM (only platforms)
LT	Raudėnai		2015	1300/2014 PRM (only platforms)
LT	Telšiai		2015	Non-application of PRM TSI
LT	Mockava		2015	2008/164/EB PRM (only platforms)
LT	Šeštokai		2015	1300/2014 PRM (only platforms)
LT	Marijampolė		2015	1300/2014 PRM (only platforms and subways)
LT	Kalvarija		2015	1300/2014 PRM (only platforms)
LT	Vinčai		2015	1300/2014 PRM (only platforms)
LT	Kazlų rūda		2015	1300/2014 PRM (only platforms)
LT	Mauručiai		2015	1300/2014 PRM (only platforms)
LT	Jiesia		2015	Non-application of PRM TSI
LT	Kaunas		2015	1300/2014 PRM (only platforms and subways)
LU	Sandweiler-Contern	Line 3 Luxembourg – Wasserbillig-border via Sandweiler-Contern	2015	Assessment ongoing
LU	Cents-Hamm	Line 3 Luxembourg – Wasserbillig-border via Sandweiler-Contern	2015	Assessment ongoing
LU	Howald	Ligne 6 Luxembourg - Bettembourg-Frontière	2017	Assessment ongoing
LU	Pfaffenthal-Kirchberg	Ligne 1 Luxembourg - Troisvierges-Frontière	2017	Assessment ongoing
HU	Pestszentlőrinc	Budapest - Szolnok - Záhony oh.	2015	No
HU	Tárnok	Budapest - Nagykanizsa - Gyékényes oh.	2015	No
HU	Martonvásár	Budapest - Nagykanizsa - Gyékényes oh.	2015	No
HU	Kápolnásnyék	Budapest - Nagykanizsa - Gyékényes oh.	2015	No
HU	Gárdony	Budapest - Nagykanizsa - Gyékényes oh.	2015	No
HU	Piliscsaba	Budapest-Szolnok-Lőkösháza oh.	2015	No
HU	Mezőtúr	Budapest-Szolnok-Lőkösháza oh.	2015	No
HU	Gyoma	Budapest-Szolnok-Lőkösháza oh.	2015	No
HU	Békéscsaba	Budapest-Szolnok-Lőkösháza oh.	2016	Yes
HU	Csárdaszállás	Budapest-Szolnok-Lőkösháza oh.	2016	Yes
HU	Mezőberény	Budapest-Szolnok-Lőkösháza oh.	2016	Yes
HU	Murony	Budapest-Szolnok-Lőkösháza oh.	2016	Yes
HU	Vác	Budapest-Szob oh.	2017	Yes
NL	Barneveld Zuid	Barneveld - Ede-Wageningen	2015	
NL	Utrecht Vaartsche Rijn	Utrecht - Geldermalsen	2016	
NL	Boskoop Snijdelwijk	Gouda - Alphen aan de Rijn	2017	

Member State	Station name/ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
PL	Wilkołaz	68, Lublin-Przeworsk	2015	Yes
PL	Jarosławiec	72, Zawada-Hrubieszów Miasto	2015	Only freight traffic
PL	Łódź Fabr.	17, Łódź Fabr.-Koluszki; 458, Łódź Fabr-Łódź Widzew	2016	Yes
PL	Zamość Szopinek	72, Zawada-Hrubieszów Miasto	2016	Only freight traffic
PL	Baborów	177, Racibórz-Głubczyce	2016	Only freight traffic
PL	Huta Krzeszowska	66, Zwierzyniec Tow. - Stalowa Wola Płd.	2017	Only freight traffic
PL	Bezwola	30, Łuków - Lublin Północny	2017	Only freight traffic
PL	Brzeźnica Bychowska	30, Łuków - Lublin Północny	2017	No
PL	Radzyń Podlaski	30, Łuków - Lublin Północny	2017	Yes
RO	Vaslui	600 Vaslui - Buhăeşti	2015	Yes
RO	Piatra Neamţ	509 Piatra Neamţ - Bicaz	2015	Yes
RO	Curtici	200 Curtici - Simeria	2016	Yes
RO	Arad	200 Curtici - Simeria	2016	Yes
RO	Şofronea	200 Curtici - Simeria	2016	Yes
RO	Giurgiu Oraş	903 Videle - Giurgiu Nord - Giurgiu Oraş - Ruse	2016	Yes
RO	Călăraşi Sud	802 Slobozia Veche - Călăraşi Sud	2016	Yes
RO	Brăila	700 Bucureşti Nord - Brăila	2016	Yes
RO	Botoşani	511 Vereşti - Botoşani	2016	Yes
RO	Sf. Gheorghe	400 Braşov - Sf. Gheorghe	2016	Yes
RO	Zalău	412 Zalău Nord - Sărmăşag	2016	Yes
RO	Slatina	901 Slatina Costeşti	2016	Yes
RO	Reşiţa Sud	915 caransebeş - Reşiţa Sud	2016	Yes
RO	Bistriţa	406 Bistriţa Bârgăului - Bistriţa Nord	2017	Yes
SI	Ruše Tovarna	34 Maribor-Prevalje-s.b.	2015	Yes
SI	Divača	50 Ljubljana-Sežana-s.b.	2015	Yes
SI	Košana	50 Ljubljana-Sežana-s.b.	2015	Yes
SI	Solkan	70 Jesenice-Sežana	2016	Yes
SI	Ljutomer mesto	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Veržej	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Murska Sobota	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Pušenci	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Grlava	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Cirkovce	40 Pragersko-Ormož	2016	Yes
SI	Šikole	40 Pragersko-Ormož	2016	Yes
SI	Strnišče	40 Pragersko-Ormož	2016	Yes
SI	Pavlovci	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Hajdina	40 Pragersko-Ormož	2016	Yes
SI	Ivanjkovci	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Ljutomer	41 Ormož-Hodoš-s.b.	2016	Yes
SI	Dolga Gora	30 Zidani Most-Šentilj-s.b.	2017	Yes
SK	177253/Púchov	2701/47, Nové Mesto nad Váhom - Púchov	2015	Yes
FI	Kyminlinna	237+255	2015	Yes
FI	Lentoasema	26+575	2015	Yes
FI	Vehkala	15+997	2015	Yes
FI	Kivistö	12+281	2015	Yes
FI	Aviapolis	25+135	2015	Yes
FI	Leinelä	31+146	2015	Yes
FI	Pännäinen	518+604	2016	Yes
FI	Kempele	741+075	2016	Yes
FI	Henna (Lähdemäki)	79+373	2017	Yes
FI	Härmä	472+940	2017	Yes
NO	Tomter	Skøyen - Oslo - Ski - Mysen -- Rakkestad	2015	Yes

Member State	Station name/ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
NO	Spydeberg	Skøyen - Oslo - Ski - Mysen -- Rakkestad	2015	Yes
NO	Mysen	Skøyen - Oslo - Ski - Mysen -- Rakkestad	2015	Yes
NO	Kråkstad	Skøyen - Oslo - Ski - Mysen -- Rakkestad	2015	Yes
NO	Greverud	Stabekk - Oslo - Ski	2015	
NO	Stabekk	Stabekk - Oslo - Ski	2015	Yes
NO	Høvik	Stabekk - Oslo - Ski	2015	Yes
NO	Varingskollen	Oslo - Gjøvik	2015	
NO	Tverlandet	Trondheim - Bodø	2015	Yes
NO	Voss	Oslo - Bergen	2016	Yes
NO	Strømmen	Spikkestad - Oslo - Lillestrøm	2016	see *
NO	Hell	Trondheim - Bodø	2016	Yes
NO	Åndalsnes	Dombås - Åndalsnes	2016	see *
NO	Øksnadvadporten	Egersund - Stavanger	2016	see *
NO	Holmestrand	Lilleshammer - Oslo - Skien	2016	Yes
NO	Torp	Lilleshammer - Oslo - Skien	2016	see *
NO	Homlia	Stabekk - Oslo - Ski	2016	see *
NO	Askim	Skøuen - Oslo - Ski - Mysen - Rakkestad	2016	Yes
NO	Knapstad	Skøuen - Oslo - Ski - Mysen - Rakkestad	2016	see *
NO	Moelv	Oslo - Trondheim	2017	see*
NO	Stange	Oslo - Trondheim	2017	see*
NO	Nordby	Drammen - Oslo - Dal	2017	see*
NO	Trondheim airport	Trondheim - Bodø	2017	Yes
NO	Skotbu	Skøyen - Oslo- Mysen - Rakkestad	2017	see*
NO	Løten	Harmar - Røros - Trondheim	2017	

*These stations were upgraded some years ago, mostly before 2012. With some minor upgrading in the period 2016 - 2017, these stations are classified to "universal design"

Source: NSA Survey

Annex 9 – List of railway stations closed during the reporting period

Member State	Station ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
BG	-	Railway line No. 2 / BP (Block post) VARNA ZAPAD (РП Варна Запад)	2015	No
BG	273029	Railway line No. 2/ LETNITSA (Летница)	2015	No
BG	273029	Railway line No. 2 / BUTOVO (Бутово)	2015	No
BG	165027	Railway line No. 18 / KRICHIM (Кричим)	2015	No
BG	297150	Railway line No. 28 / GENERAL TOSHEVO (Генерал Тошево)	2015	No
BG	720334	Railway line No. 7 / VODNYANTSI (Воднянци)	2015	No
BG	720169	Railway line No. 7 / RAKEVO (Ракево)	2015	No
BG	443305	Railway line No. 4 / KNIZHOVNIK (Книжовник)	2015	No
BG	230185	Railway line No. 2 / BP LEVISHTE (РП Левище)	2015	No
BG	240275	Railway line No. 2 BP NADAREVO (РП Надарево)	2015	No
BG	340133	Railway line No. 3 / CHINTULOVO (Чинтулово)	2015	No
BG	270454	Railway line No. 2 / BP LESITCHERI (РП Лесичери)	2015	No
BG	340109	Railway line No. 3 / CHUMERNA (Чумерна)	2015	No
BG	-	Railway line No. 4 / BP DOROSTOL (РП Доростол)	2015	No
BG	-	Railway line No. 2 / BP RAZDELNA (РП Разделна)	2016	No
BG	320325	Railway line No. 3 / IGANOVO (Иганово)	2016	No
BG	340034	Railway line No. 3 / NIKOLAEVO (Николаево)	2016	No
DE	6886	Worms Brücke	2015	No
DE	1811	Flensburg Weiche	2015	No
DE	4924	Pfraundorf (Inn)	2015	No
DE	3223	Klebitz	2015	No
DE	299	Bad Lauchstädt	2015	No
DE	300	Bad Lauchstädt West	2015	No
DE	967	Buna Werke	2015	No
DE	2301	Groß Gräfendorf	2015	No
DE	4069	Merseburg Elisabethhöhe	2015	No
DE	4116	Milzau	2015	No
DE	5531	Schafstädt	2015	No
DE	4959	Plauen (Vogtl)-Chrieschwitz	2015	No
DE	3603	Lauterbach (Mole)	2015	No
DE	8148	Lauterbach (Rügen)	2015	No
DE	5061	Putbus	2015	No
DE	2002	Gallin	2016	No
DE	3820	Lübz	2016	No
DE	4875	Passow (Meckl)	2016	No
DE	2761	Hildbrandsgrün	2016	No
DE	2377	Grub (Oberpf)	2016	No
DE	3865	Lutherstadt Wittenberg West	2016	No
DE	4129	Mittelndorf	2016	No
DE	4878	Pausa	2016	No
DE	1237	Döbeln Zentrum	2016	No
DE	2144	Gleisberg-Marbach	2016	No
DE	4532	Niederstriegis	2016	No
DE	5364	Roßwein	2016	No
DE	1189	Deutschenbora	2016	No

Member State	Station ID	Railway line identification (e.g. origin/destination name)	Year	PRM TSI-compliant?
DE	4113	Miltitz-Roitzschen	2016	No
DE	4589	Nossen	2016	No
DE	4956	Plauen (Vogtl) unt Bf	2016	No
DE	4958	Plauen (Vogtl) Zellwolle	2016	No
DE	3708	Liebenau (Bz Kassel)	2016	No
DE	3225	Kleeth	2017	No
DE	3023	Jägerhaus	2017	No
DE	6327	Umrathshausen Bahnhof	2017	No
DE	2074	Gera Ost	2017	No
DE	2078	Gera-Liebschwitz	2017	No
DE	5096	Raestrup-Everswinkel	2017	No
LT		Nemėžis	2015	
NL	Geerdijk	Almelo - Marienberg	2016	
NL	Schiedam Nieuwland		2017	
NL	Vlaardingen-Oost		2017	
NL	Vlaardingen Centrum		2017	
NL	Vlaardingen-West		2017	
NL	Maasluis		2017	
NL	Maasluis-West		2017	
NL	Hoek van Holland Haven		2017	
NL	Hoek van Holland Strand		2017	
PL	Trzciana	91, Kraków Główny-Medyka	2015	
PL	Kędzierzyn Koźle Port	174, Kędzierzyn Koźle KKD-Kędzierzyn Koźle Port	2015	
PL	Słupia	272, Kluczbork-Poznań Główny	2015	
PL	Czarna Tarnowska	91, Kraków Główny-Medyka	2015	
PL	Grabiny	91, Kraków Główny-Medyka	2015	
PL	Biadoliny	91, Kraków Główny-Medyka	2015	
PL	Knurów Szczygłowice	149, Zabrze Makoszowy-Leszczyny	2016	
PL	Ruda Czarny Las	187, KWK Pokój-Ruda Orzegów	2017	
PL	Mordy	31, Siedlce-Siemianówka	2017	
PL	Rudawa	133, Dąbrowa Górnicza Ząbkowice-Kraków Główny	2017	
FI	Mankki	25+401	2016	No
FI	Luoma	27+807	2016	No
FI	Nuppulinna	44+210	2016	No
NO	Notodden kollektivterminal	Porsgrunn - Skien - Notodden	2015	

Source: NSA Survey

Annex 10 – List of new sections of lines put in service with ETCS and GSM-R, incl. length (km)

Member State	Section between '[name location x]' and 'name location y]'	ETCS	GSM-R	Year
BE	Virton and Bertrix	95.77	95.77	2013
BE	Bertrix and Anseremme	153.11	153.11	2013
BE	Pécrot and Ottignies	22.87	22.87	2013
BE	Hever and Duffel	47.04	47.04	2013
BE	Ottignies (1st part)	20.15	20.15	2014
BE	Anseremme and Jambes	54.71	54.71	2014
BE	Duffel and Antwerpen-Berchem	67.72	67.72	2014
BE	Liefkenshoek Tunnel	31.77	31.77	2015
BE	Harenheide and Keelbeek	1.79	1.79	2015
BE	Ronet and Chapelle-Dieu	64.67	64.67	2015
BE	Antwerpen-Berchem and Station Antwerpen	46.79	46.79	2015
BE	Antwerpen-Oost and Ekeren	28.59	28.59	2015
BE	Auvelais and Ceroux-Mousty	54.57	54.57	2015
BE	Athus and Virton	46.34	46.34	2015
BE	Wijgmaal and Hever	34.29	34.29	2015
BE	Leuven (1st part)	32.65	32.65	2015
BE	Rhisnes and Mont-Saint-Guibert	44.49	44.49	2015
BE	Namur	67.23	67.23	2015
BE	Nazareth and Aubry + Lier and Duffel	34.11	34.11	2016
BE	Athus and Luxembourg Border	3.48	3.48	2017
BE	Gouvy and Troisvierges (1st phase)	0.35	0.35	2017
BE	Arlon and Luxembourg Border (Kleinbettingen)	10.77	10.77	2017
BE	Leuven (2nd part)	29.5	29.5	2017
BE	Leuven and Ans	126.9	126.9	2017
BE	Ans and Angleur	56.23	56.23	2017
CZ	Ostrava - st. hr. (SK); Přerov - Česká Třebová		197	2013
CZ	Prostřední Žleb - Všetaty - Kolín		161	2013
CZ	Vstup ETCS Břeclav - Kúty (SK)		12	2014
CZ	Vstup ETCS Hohenau (A) - Břeclav		12	2014
CZ	Vstup ETCS Letohrad - Ústí nad Orlicí		7	2014
CZ	Uzel Praha (Beroun - Praha - Benešov)		133	2015
CZ	Cheb - Vojtanov - st. hr.		15	2015
CZ	Benešov - Votice		19	2016
CZ	Znojmo - Šatov - st. hr.		13	2016
CZ	Kolín - H. Brod - Křižanov - Brno		192	2016
CZ	Beroun - Plzeň - Cheb - st. hr. (1. etapa)		194	2016
CZ	Implementace funkcionality STOP GSM-R		0	2017
DK	København H - Fredericia / Taulov		151.319	2013

Member State	Section between '[name location x]' and 'name location y]'	ETCS	GSM-R	Year
DK	Ringsted - Rødby Færge		119.296	2013
DK	Roskilde - Køge - Næstved		61.415	2013
DK	Roskilde - Kalundborg		79.333	2013
DK	København H - Vigerslev		12.658	2013
DK	København H - Helsingør		46.161	2013
DK	København H/Hvidovre Fjern - Peberholm		10.246	2013
DK	Odense - Svendborg		48.22	2013
DK	Fredericia - Aarhus H		108.478	2013
DK	Aarhus H - Aalborg		139.882	2013
DK	Aalborg - Frederikshavn		84.977	2013
DK	Fredericia - Padborg		110.641	2013
DK	Tinglev - Sønderborg		41.155	2013
DK	Lunderskov - Esbjerg		55.7	2013
DK	Bramming - Tønder		67.844	2013
DK	Esbjerg - Struer		146.745	2013
DK	Langå - Struer		102.405	2013
DK	Vejle - Holstebro		114.155	2013
DK	Struer - Thisted		73.6	2013
DK	Skanderborg - Skjern		111.894	2013
DK	Valby - Hellerup	NA	11.75	2013
DK	Køge - Dybbølsbro	NA	38.98	2013
DK	Høje Taastrup - Valby	NA	15.575	2013
DK	Frederikssund - Valby	NA	37.915	2013
DK	Farum - Svanemøllen	NA	21.5	2013
DK	Hillerød - Hellerup	NA	28.675	2013
DK	Klampenborg - Hellerup	NA	5.487	2013
DK	Hellerup - Ny Ellebjerg	NA	11.715	2013
DK	BS 041 and BS 042 Østbanen	NA	49	2014
DK	BS 051 Tølløsebanen	NA	51	2014
DK	BS 052 Odsherredbanen	NA	49	2014
DK	BS 101 Lille Nord	NA	19	2014
DK	BS 102 Hornbækbanen	NA	26	2014
DK	BS 201 Lollandsbanen	NA	49	2014
DK	BS 231 Odderbanen	NA	26.5	2014
DK	BS 251 Hirtshalsbanen	NA	17.8	2014
DK	BS 252 Skagensbanen	NA	38.8	2014
DK	BS 311 Vestbanen	NA	37.7	2014
DK	BS 312 Lemvigbanen	NA	59.9	2014
DK	BS 801 Nærumbanen	NA	8	2014
DK	BS 802 and BS 803 Gribskovbanen	NA	43	2014
DK	BS 804 Frederiksværkbanen	NA	40	2014
DE	Halle(Saale)/Leipzig - Erfurt (NBS 5919 inkl. Zulaufstrecken ca. 126km)	L2 SRS 2.3d	X	2015
DE	Erfurt - Zapfendorf (NBS 5919 ca. 120km)	L2 SRS 2.3d	x	2017
ES	LAV Barcelona Sants pk 620+122 to Figueras Station pk 752+335 (ERTMS N1)	132.213	132.213	2013
ES	LAV Albacete Station (southern head) pk 321+689 to pk 324+832 (ERTMS N1)	3.143	3.143	2014
ES	LAV Albacete Station (southern head) pk 324+832 to Alicante Station pk 485+925 (ERTMS N2)	161.093	161.093	2014
ES	LAV Córdoba-Málaga (migration to version 2.3.0d ERTMS N1)	147.975		2016
ES	LAV Madrid-Lérida (migration to version 2.3.0d ERTMS N1)	448.237		2016
ES	LAV Madrid-Valencia/Albacete (ERTMS N2)	426.581	426.581	2016
HR	Novska Okučani	20	NO	2016

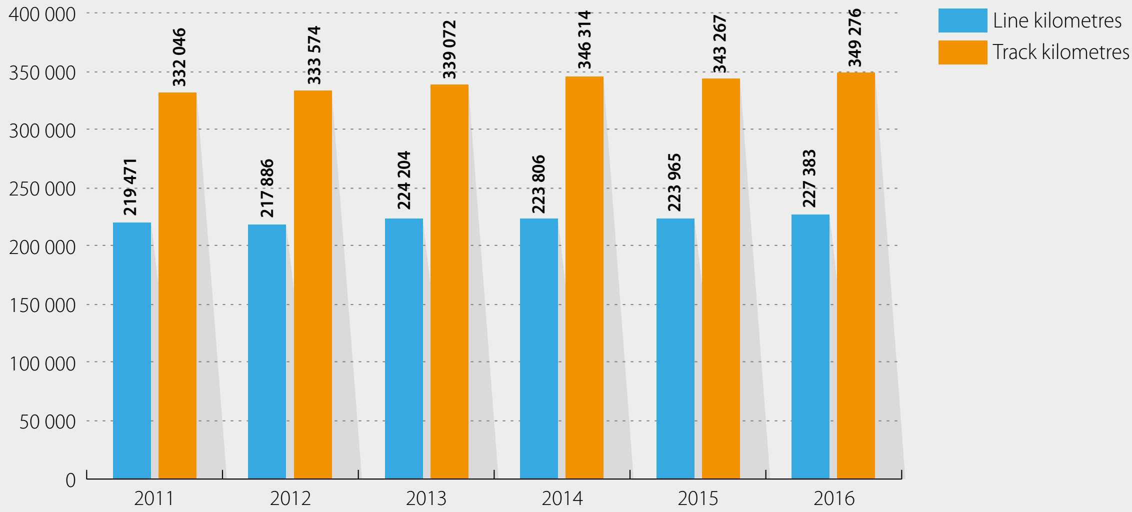
Member State	Section between '[name location x]' and 'name location y]'	ETCS	GSM-R	Year
LU	Gare Luxembourg	x		2016
LU	Line 1 Luxembourg - Troisvierges-border	x		2017
LU	Line 1a Ettelbruck - Diekirch	x		2017
LU	Line 1b Kautenbach - Wiltz	x		2017
LU	Line 2b Ettelbruck - Bissen	x		2017
LU	Line 3 Luxembourg – Wasserbillig-border via Sandweiler-Contern	x		2017
LU	Line 4 Luxembourg - Berchem - Oetrange	x		2017
LU	Line 5 Luxembourg - Kleinbettingen-border	x		2017
LU	Line 6 Luxembourg - Bettembourg-border	x		2017
LU	Line 6a Bettembourg - Esch/Alzette	x		2017
LU	Line 6b Bettembourg - Dudelange-Usines (Volmerange)	x		2017
LU	Line 6c Noertzange - Rumelange	x		2017
LU	Line 6d Tétange - Langengrund	x		2017
LU	Line 6e Esch/Alzette - Audun-le-Tiche	x		2017
LU	Line 6f Esch/Alzette - Pétange	x		2017
LU	Line 6g Pétange - Rodange-border (Aubange)	x		2017
LU	Line 6h Pétange - Rodange-border (Mont St. Martin)	x		2017
LU	Line 6j Pétange - Rodange-border (Athus)	x		2017
LU	Ligne 6k Brucherberg - Scheuerbusch	x		2017
LU	Ligne 7 Luxembourg - Pétange	x		2017
HU	Kelenföld - Hegyeshalom oh. ETCS L1 not verifies	174	no	2013
HU	Hegyeshalom - Rajka oh. ETCS L1	13	no	2016
AT	Nordbahn (Wien Erdbergerlände – Hohenau)	L2	X	2014
AT	GZU (Knoten Wagram - Knoten Rohr)	L2	X	2017
PL	line 4: Grodzisk Mazowiecki - Zawiercie	224	0	2013
PL	line E30: Bielawa Dolna - Legnica	0	74	2014
PL	line 64: Kozłów - Psary	33	0	2016
PL	line E30: Bielawa Dolna - Legnica	74	0	2016
PL	line E30 Legnica - Opole	0	143	2016
PL	line 365: Poznań Wschód - Wągrowiec	51	0	2016
PL	line 2: Warszawa Podskarbińska - Terespol	0	207	2016
PL	line 3: Warszawa Gołąbki - Kunowice	0	467	2016
PL	line 11: Skierniewice - Łowicz Główny	0	22	2016
PL	line 12: Skierniewice - Łuków	0	161	2016
SI	Zidani most-Ljubljana	63.851		2015
SI	Ljubljana Zalog-cepišče Kajuhova; P3	2.660		2015
SI	Ljubljana Zalog-Ljubljana; P4	3.854		2015
SI	Ljubljana Zalog-Ljubljana; P5	3.506		2015
SI	Lok Zidani Most	1.284		2015
SI	Zidani most-Pragersko	70.374		2015
SI	Pragersko-Ormož	40.273		2015
SI	Ormož-Hodoš-d.m.	69.215		2015
SI	Lok Pragersko	0.636		2015
SI	Ljubljana-Sežana-d.m.	116.592		2015
SI	Lok Divača	1.040		2015
SI	Divača-Cepišče Prešnica	16.479		2015
SI	Cepišče Prešnica-Koper	31.553		2015
SI	d.m.-Dobova-Ljubljana		114.751	2017
SI	Ljubljana Zalog-cepišče Kajuhova; P3		2.660	2017
SI	Ljubljana Zalog-Ljubljana; P4		3.854	2017
SI	Ljubljana Zalog-Ljubljana; P5		3.506	2017
SI	Lok Zidani Most		1.284	2017
SI	Zidani most-Pragersko-Šentilj-d.m.		108.274	2017
SI	Pragersko-Ormož		40.273	2017

Member State	Section between '[name location x]' and 'name location y]'	ETCS	GSM-R	Year
SI	Ormož-Hodoš-d.m.		69.215	2017
SI	Lok Pragersko		0.636	2017
SI	Ljubljana-Sežana-d.m.		116.592	2017
SI	Lok Divača		1.040	2017
SI	Divača-Cepišče Prešnica		16.479	2017
SI	Cepišče Prešnica-Koper		31.553	2017
SI	Ljubljana – Jesenice – d.m.		70.898	2017
SI	Ormož-Središče-d.m.		11.615	2017
SI	Pivka – Ilirska Bistrica – d.m.		24.405	2017
SI	Ljubljana Šiška-Kamnik Graben		23.010	2017
SI	Celje-Velenje		37.967	2017
SI	d.m.-Rogatec-Grobelno		36.496	2017
SI	d.m.-Imeno-Stranje		14.236	2017
SI	Maribor-Prevalje-d.m.		82.672	2017
SI	Lok Maribor Tezno-Maribor-Studenci		1.033	2017
SI	Ljutomer-Gornja Radgona		23.050	2017
SI	Cepišče Prešnica-Podgorje-d.m.		14.721	2017
SI	Jesenice-Sežana		129.185	2017
SI	Cepišče Šempeter pri Gorici-Vrtojba-d.m.		1.855	2017
SI	Prvačina-Ajdovščina		14.833	2017
SI	Cepišče Kreplje-Repentabor-d.m.		2.501	2017
SI	d.m.-Metlika- Ljubljana		123.362	2017
SI	Sevnica-Trebnje		31.345	2017
SI	Grosuplje-Kočevje		49.184	2017
SK	Nové Mesto nad Váhom - Zlatovce	ETCS L1		2013
SK	Bratislava - Žilina - Čadca - border point SK/CZ		GSM-R	2015
SK	Žilina - Čadca - border point SK/CZ	ETCS L2		2015
SK	Trenčianska Teplá - Púchov	ETCS L1		2016
SK	Zlatovce - Trenčianska Teplá	ETCS L1		2017
SK	Považská Teplá (besides) - Žilina (besides)	ETCS L1		2017
NO	Østfoldbanen Eastern Line between (Ski) and (Sarpsborg) - 80 km	L2 B2	Since 2007	2015

Source: NSA Survey

Annex 11 – Data normalisers

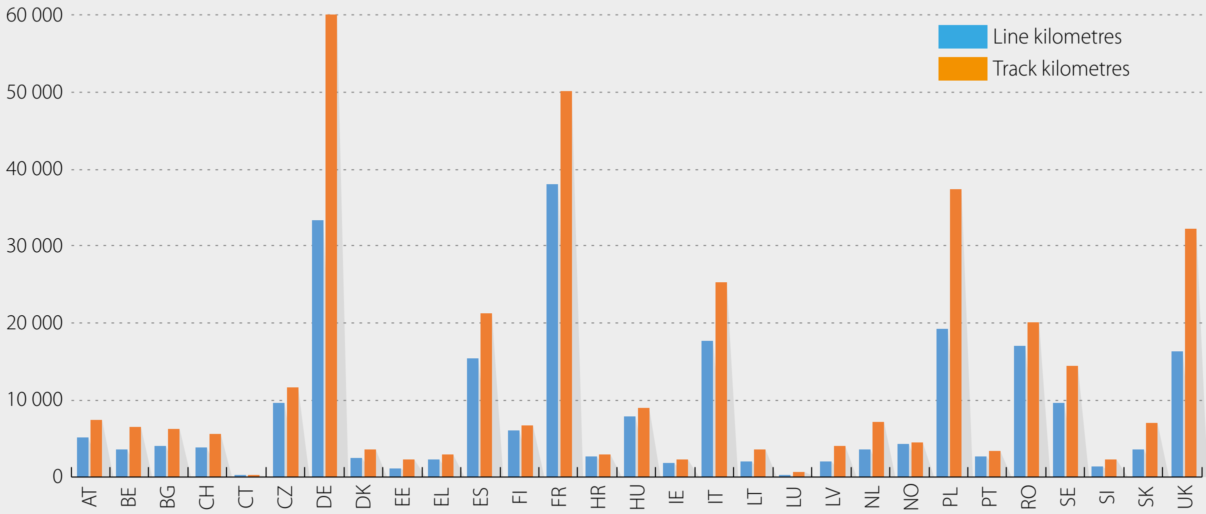
Figure 63: Rail infrastructure length (line-km and track-km), EU 28, 2011-2016



Source: CSI data, ERAIL

Note: Data quality checks are undergoing as regards some data variations for period 2014-2016.

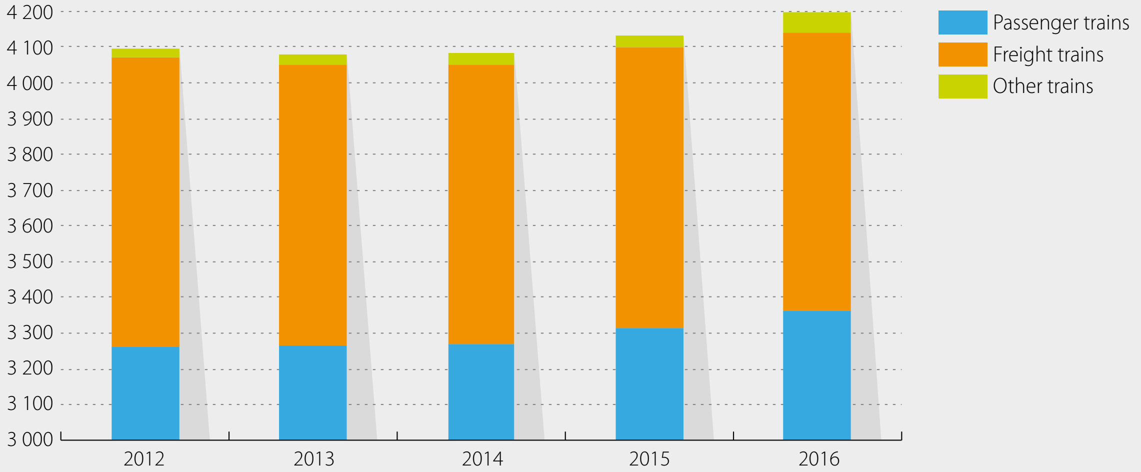
Figure 64: Rail infrastructure length (line-km and track-km) by country in SERA, 2016



Source: CSI data, ERAIL

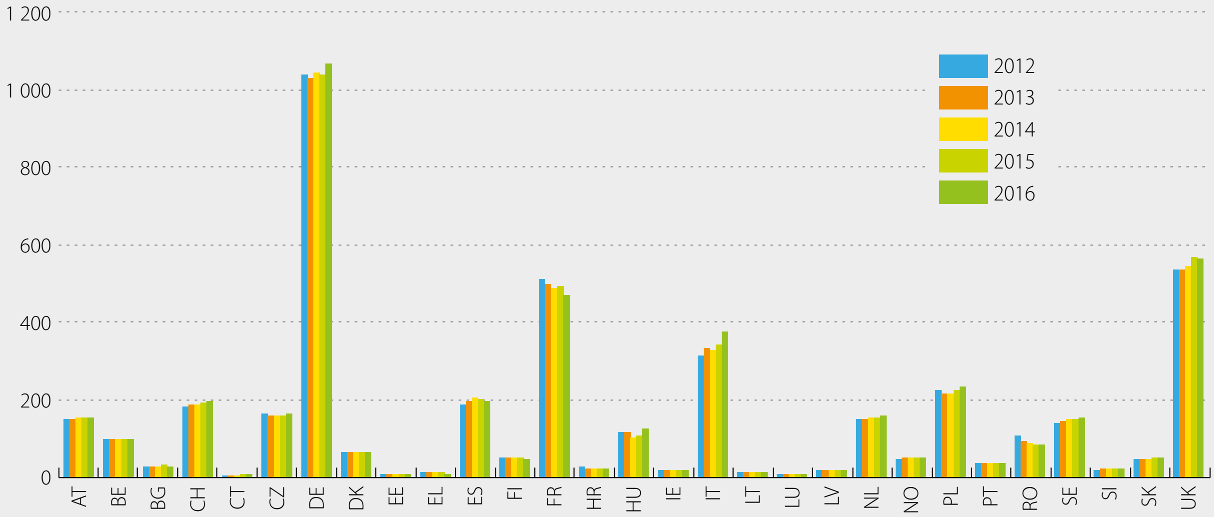
Note: Data quality checks are undergoing as regards some data variations for period 2014-2016.

Figure 65: Number of million train-km, EU 28, 2012-2016



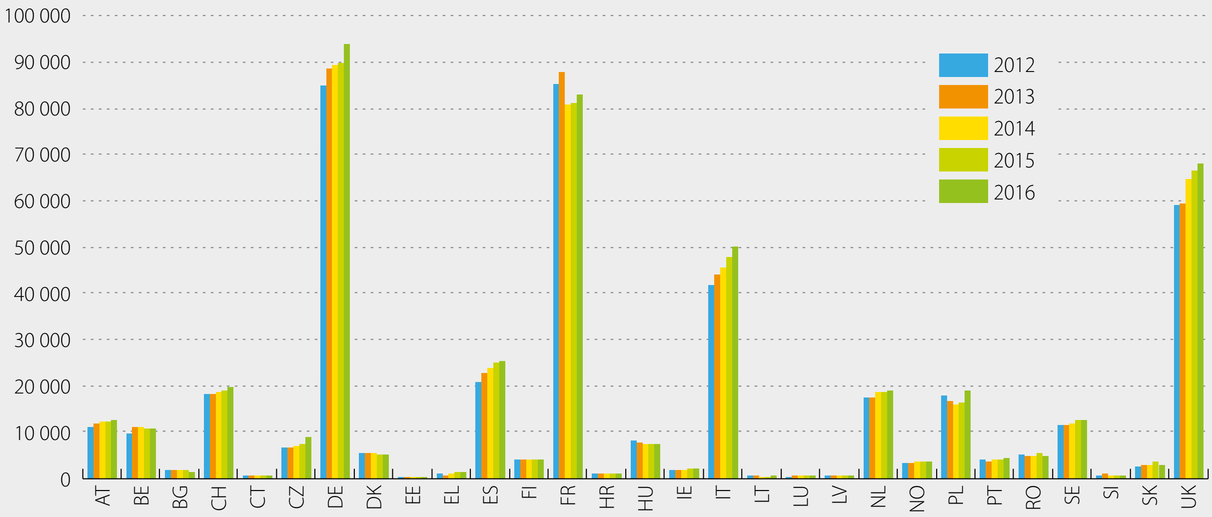
Source: CSI data, ERAIL

Figure 66: Number of million train-km by country in SERA, 2012-2016



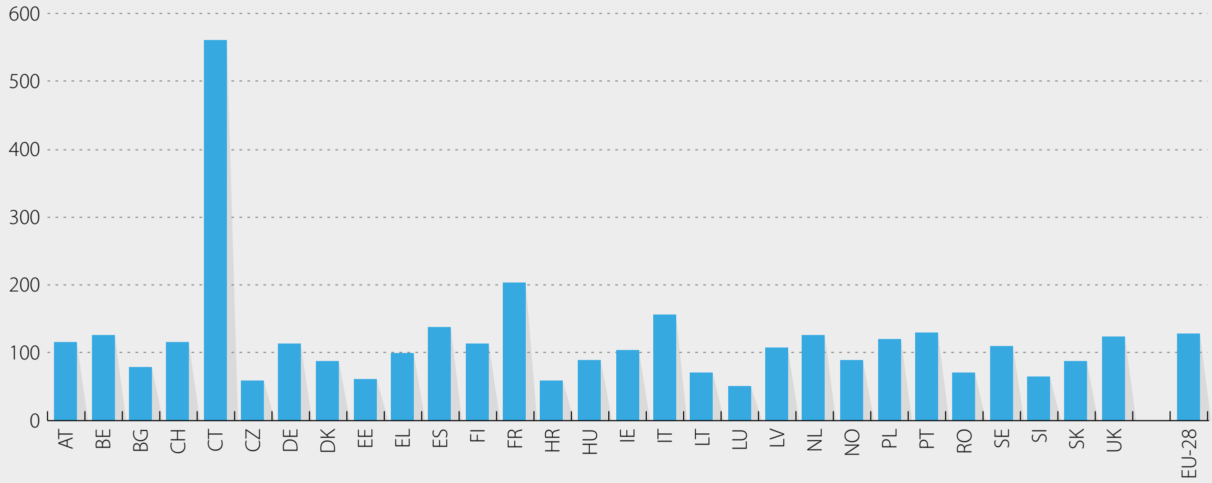
Source: CSI data, ERAIL

Figure 67: Number of million passenger-km by country in SERA, 2012-2016



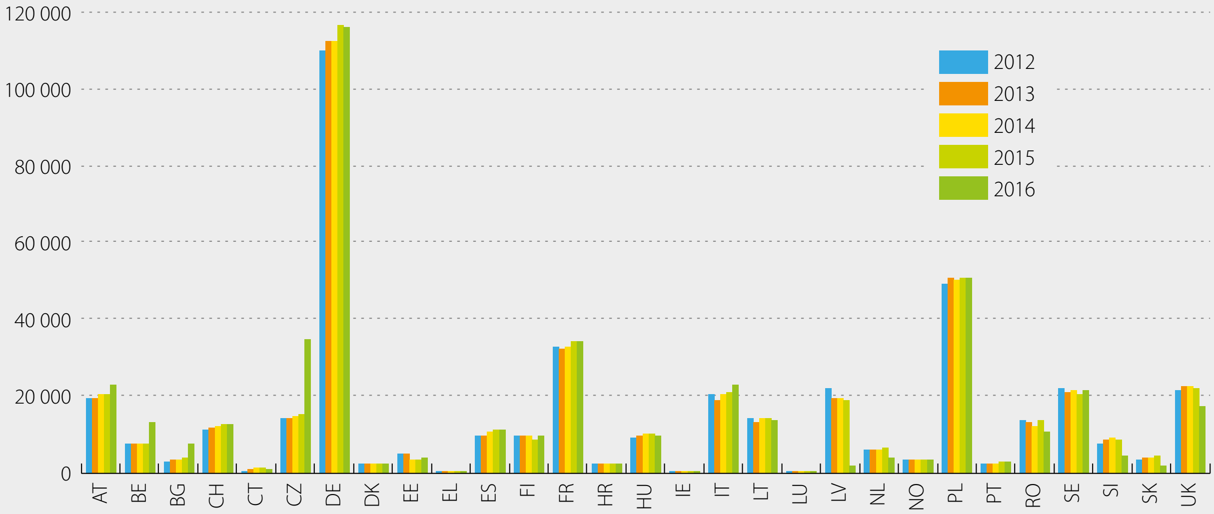
Source: CSI data, ERAIL

Figure 68: Number of passenger-km per passenger train-km by country in SERA, 2012-2016



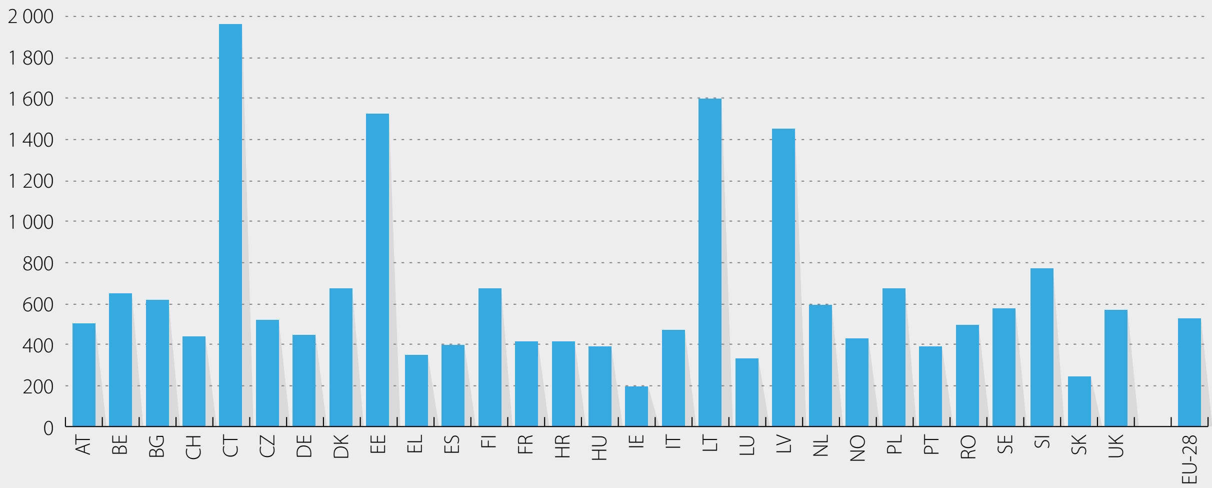
Source: CSI data, ERAIL

Figure 69: Number of million freight tonne-km by country in SERA, 2012-2016



Source: CSI data, ERAIL

Figure 70: Number of freight tonne-km per freight train-km by country in SERA, 2012-2016



Source: CSI data, ERAIL

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);
- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm) or
  calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu).

European Union Agency for Railways
120 rue Marc Lefrancq
BP 20392
FR-59307 Valenciennes Cedex
Tel. +33 (0)327 09 65 00

era.europa.eu
Twitter @ERA_railways

Making the railway system work better for society.

EUROPEAN UNION AGENCY FOR RAILWAYS

Publications Office

Print ISBN 978-92-9205-393-2 ISSN 2467-3730 doi:10.2821/49834 TR-AF-18-001-EN-C
PDF ISBN 978-92-9205-392-5 ISSN 2467-3749 doi:10.2821/205360 TR-AF-18-001-EN-N